approach

JULY 1971 · THE NAVAL AVIATION SAFETY REVIEW

HAPPY FISCAL

TRADITIONALLY, the beginning of a new year is a time for reviewing the past and making resolutions for the future. This makes sense even when talking about a new fiscal year. While it is still too early to review the complete naval aviation safety statistics for the old year (FY-71), there are indications that it will turn out to have been a very good year, indeed. In fact, it may be that FY-71 was the best year in naval aviation history as far as safety of operations are concerned. This is certainly to the good but all hands should now resolve to make FY-72 an even better year.

The so-called avoidable accident is, as always, the foremost point of attack in preventing accidents. This is so because with the benefit of past experience, the habits or circumstances which produce such accidents can be altered or avoided with proper planning and action. In other words, these are the accidents which need not be repeated during FY-72.

A study of reports indicates that many avoidable accidents can be prevented during FY-72 by resolving to:

- Be knowledgeable.
- Be proficient.
- Use good judgment.
- Comply with regulations and standard procedures.
- Be professional.

Be Knowledgeable

Today's aircraft are complicated weapons systems. A naval aviator must receive a tremendous amount of training and education before he has mastered even half of the ins and outs of today's aircraft. So much, in fact, that frequently certain compromises must be made in order to get the show on the road. That is, pilots begin initial qualification flights in most aircraft long before they attain a complete understanding of all its systems and equipment. Of course, in all cases, these pilots *have* done a great deal of preliminary study and preparation before launching. In addition, they are invariably under the direction and guidance of an experienced instructor during the qualification phase. With such safeguards in operation, these compromises are reasonable. However, they are still compromises because ideally, each pilot would know every nut and bolt of his machine and always be able to make the ideal response whenever trouble develops. This ideal, unfortunately, is seldom realized. In reality, there is almost always a gap between the actual knowledge of a pilot and the ideal knowledge. In the majority of cases, this gap is of little consequence but it definitely is of consequence in some cases. During FY-70, for example, there were 29 major aircraft accidents in which incorrect operation of an aircraft system or component was a contributing factor; and it was the primary cause factor in 15 major accidents. In addition, incorrect operation of an aircraft system or component figured in a total of 163 minor aircraft accidents/incidents during FY-70.

Basically, it is a matter of improving the odds. Some compromise is inevitable, especially when a pilot first begins flying a new type aircraft. This is when the gap in knowledge is likely to be the greatest and the individual has the least recourse. However, with every hour in the aircraft, the gap in knowledge should decrease accordingly. Unfortunately, there are indications that some pilots become lax in pursuing this knowledge once the initial checkout is completed. Pilots must not be satisfied with just getting by. They must learn all they can about their aircraft. Such knowledge can and does save lives.

Knowing the aircraft is only a part of the overall knowledge which a pilot must have. In addition to operating his aircraft correctly, he must know and understand a myriad of rules, regulations and operating procedures. During instrument flight operations, for example, flying the aircraft is sometimes the lesser part of the overall requirement placed on the pilot. Ordnance delivery is another area where a pilot must know a great deal more than merely how to operate his aircraft in order to be successful. The list of things a pilot should ideally know is virtually endless and just as there is a gap in the actual versus ideal knowledge of the aircraft, there is likely to be a gap in the actual versus ideal knowledge

NEW YEAR!

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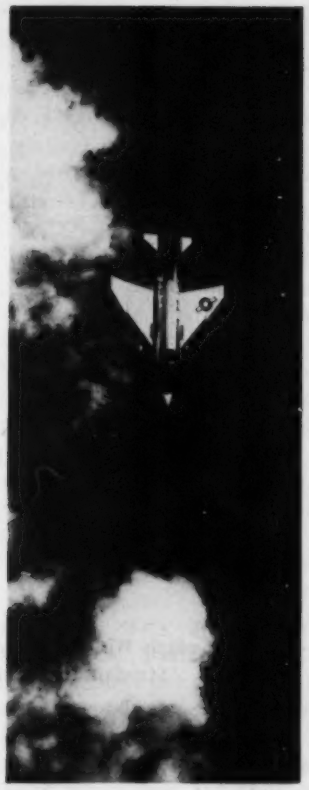
of rules, regulations and operating procedures. The smaller the gap, the better the odds for successful and safe flight operations.

Be Proficient

Proficiency means knowing what to do and being able to do it well. It is easy to see, therefore, that a proficient pilot is likely to be a relatively safe pilot. How can a pilot become proficient and stay proficient? It is a matter of study and practice, followed by *continuing* study and practice. Unfortunately, the range of naval aviation flight operations is such that few naval aviators are able to be continuously proficient in all areas at all times. So compromise is inevitable; however, the professional naval aviator should strive to maintain a high degree of proficiency in the aircraft he is currently flying and in the operations he is currently engaged in. Moreover, whenever he undertakes to fly an aircraft in which he has little or no recent experience or engage in a new operation in which he has little or no recent experience, he should do so cautiously and avail himself of all possible safeguards while he builds proficiency. One of the very best safeguards any pilot can avail himself of is to adhere to standard procedures, the foremost example of which is NATOPS. By so doing, he is often able to safely channel more time and attention to those operations which demand a high degree of skill and judgment.

Being highly proficient means being precise. Pilots should strive to be precise in every aspect of air operations. This means making every minute of training time count – both in the air and on the ground. Maximum use of OFT/procedures trainers which are relatively inexpensive for certain types of training should be stressed. Pilots should learn everything they can while on the ground and be aggressive in getting the maximum practical experience while in the air. If landings become a little rusty, a few touch-and-go landings at the end of the flight will sharpen up pilot technique. Ditto for GCAs. If airways procedures need improvement, the pilot should file an IFR flight plan if at all feasible. Regardless of how high a pilot's proficiency is at any



given time, it will begin to decrease immediately unless continuing efforts are made to keep sharp. This rules out "boring holes" to build flight time. Make training time count!

Use Good Judgment

Judgment is defined by Webster as "the ability to make a decision based on available evidence." To the extent that the "available evidence" can be predetermined, good judgment can be predetermined. This is the basis for NATOPS and other standard operating procedures. In other words, the most appropriate action or response can be determined in advance provided a situation can be idealized. Unfortunately (or fortunately, depending upon your viewpoint), it is impossible to predefine every situation a pilot may encounter – or even most of them. Aircraft, operations and people are simply too complex. Because of this, naval aviators often find themselves in situations which have no exact precedent. It is then up to the individual pilot to render a good decision based on the available evidence. It's worth noting, however, that while these situations have no exact precedent, it is a rare problem or situation which is totally new to human

experience. Therefore, as a general rule, it is obvious that the more knowledgeable and experienced a pilot is, the simpler will be his task of making a good decision. It is also important to note that experience does not necessarily have to be *personal* in order to be valuable. A pilot can often use the experience of others with good effect in the decision-making process. This is the basis for all safety education efforts – *learning from the experience of others.*

Motivation is important also in making good decisions. The desire to be a professional among professionals can hardly be overestimated as a motivating force leading to good decisions. In this connection, it should be noted that individuals are usually highly motivated to follow the example of their leaders and can generally be expected to do so even in the face of verbal or written guidance to the contrary. Flight leaders and others in supervisory positions should, therefore, be continuously aware that their own actions are certain to have a profound effect upon the motivation of juniors to make the best possible decisions.

Comply With Regulations and Standard Procedures

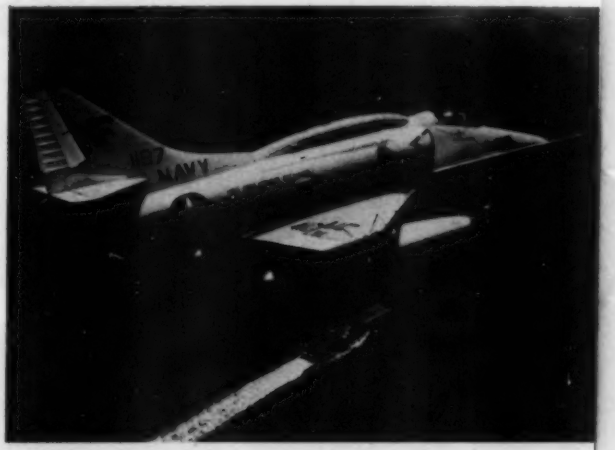
Mere failure or inability to comply with regulations and standard procedures can be classified as poor judgment. However, deliberate, intentional violation of well-established, well-known regulations and standard procedures deserve a more emphatic characterization. About the best that can be said of it is that it is *grossly* poor judgment. Not many accidents result from such violations of regulations and rules but even a few are too many. It may, therefore, be worthwhile to review some of the accidents in the hope that they can be completely eliminated. For example:

- *Unauthorized Airshows.* These accidents occur because pilots succumb to the immature, unprofessional desire to show off. In so doing, they violate established regulations. These are the most avoidable of all aircraft accidents. They are senseless, tragic, and indicate a completely unprofessional approach to flying duties.

- *Collisions with Powerlines on Authorized Low-Level Flights.* These accidents are similar to unauthorized airshow accidents; however, an audience for the maneuvers is not an absolute necessity. Pilots may take it upon themselves to engage in excessively low-level flight for the sheer thrill of it. This is an unprofessional approach to flying duties because, first, there is no good reason for it and secondly, it is in direct violation of established regulations. This type of accident is clearly avoidable.

- *Premature Retraction of Landing Gear on Takeoff.* Most, if not all, NATOPS manuals specify that the landing gear will be raised on takeoff only after an aircraft is well clear of the runway surface and has established a positive rate of climb. In spite of these specific NATOPS procedures, a few pilots still attempt to see how fast they can "suck up the gear" after takeoff. The result is all too often a costly accident. Such accidents are clearly avoidable.

- *Certain ACM Accidents.* Considering the wide range of speed, the high angles-of-attack and the relative motion involved, it does not come as a complete surprise that this training will occasionally result in an accident. This is all the more reason why such training should be conducted under carefully controlled conditions with all practical safeguards. Unfortunately, some pilots continue to engage in ACM without fulfilling the prerequisites or abiding by the specified rules of



engagement. Two recurring violations are (1) engaging in unscheduled, unbriefed ACM and (2) failing to break off an engagement when reaching minimum specified altitudes or when a stalemate develops.

• *Failure to Maintain Standard Separation Criteria During Formation Flight.* NATOPS manuals specify standard positions for various types of formation flight. In the case of parade formation, the manuals are usually specific about lateral and vertical separation, even to the point of specifying the distance in feet. Not all pilots, however, adhere to these separation standards. In some cases it is due to simple inability to judge the distance exactly or maintain the proper position. In other cases, it is due to a deliberate intention of the pilot to fly his aircraft closer to the leader than the "law allows." In a few such cases, it is obvious that ultra-tight formations were maintained in order to impress someone – either fellow pilots, observers in the aircraft or someone on the ground. The bad feature about such formations is that the pilot leaves no margin for error. About the only thing necessary to turn an ultra-tight formation flight into a mid-air collision is a little clear air turbulence and this is exactly what has happened in several aircraft accidents. In all these cases, it was evident that the pilots not only knew the formation was too tight but they had been maintaining the position for some time prior to the accident.

• *Intentional Disregard of Checklists.* Many checklists are specified for various phases of flight and ground operation. Morally, the pilot has no option about using these checklists; nevertheless, many accidents have occurred in the past because pilots intentionally disregarded the checklists. Among other things, this has resulted in a number of wheels-up landings. All such accidents are clearly avoidable. The requirement to use checklists is based upon hard-won experience. It is most unprofessional to hazard an aircraft by intentional disregard of this recognized and needed protection against human fallibility.

• *Violations of Instrument Approach Minimums.* In previous years, the Navy has lost a number of pilots and aircraft because the pilots chose to deliberately descend below minimums on the approach, for no valid reason. Clearly such accidents can be avoided by simple compliance with regulations.

Be Professional

In a more personal vein, *be professional.* This phrase summarizes everything which has been said to this point. That is, know your aircraft, facilities, environment and operating procedures. Study and practice until you become extremely proficient in your aircraft and its operation – then continue to study and practice in order to remain proficient. If you do these things you will be *better* equipped to make good decisions when trouble arises. Finally, shun all clearly unprofessional conduct such as intentional violations of well-established, well-understood regulations, rules and procedures. Be safe. Be professional – it's the only way to go.

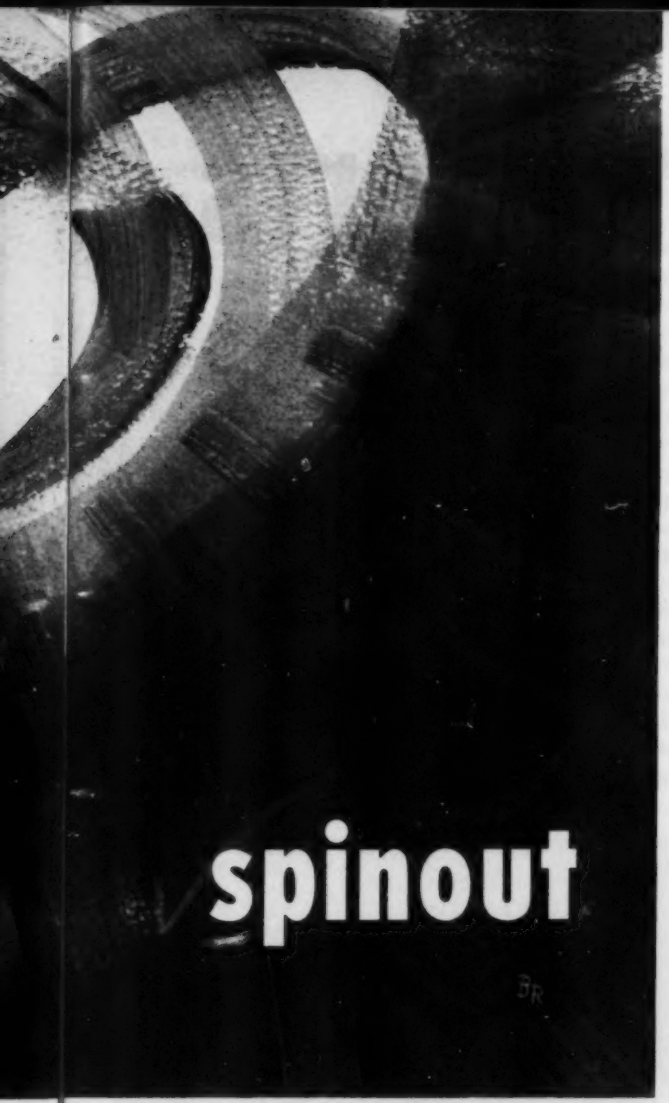
Happy New Year!

THE *PHANTOM* pilot was on his third air combat maneuvering flight. The two-plane flight was practicing rudder reversals. This maneuver calls for putting the aircraft 60 to 70 degrees nose-up, in a high energy state, and climbing in afterburner until the opponent can no longer follow the maneuver. The pilot then reduces power to decelerate and as the aircraft slows through 220 kias, the pilot begins feeding in full rudder in the direction he wishes to go and at the same time applies opposite aileron in order to prevent the aircraft from rolling. The aircraft is also unloaded to near zero G to prevent a stall from occurring.

The pilot in this case allowed the aircraft to get into a near 90-degree nose-up attitude and did not commence the reversal until the airspeed was going through 120 kias. The aircraft was at 37,000 feet and just as the pilot applied full right rudder the aircraft rolled 90 degrees to the right and fell through in a nose-low, inverted attitude, out of control. At the instructor RIO's direction the pilot applied full forward stick but does not recall neutralizing the rudders. Shortly after this the *Phantom* went to 3 negative G and the pilot deployed the drag chute with no apparent effect. Due to the G-loading, the pilot was thrown to the top left side of the canopy and was unable to see the angle-of-attack gage from this point on.

The pilot then began to apply full aileron, alternating the direction of application but leaving it in each direction for what he considered long enough time to effect a recovery.

At about 25,000 feet the pilot began to apply rudder alternately in both directions for what he considered to



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be a reasonable length of time. At about this time the starboard engine flamed out. At about 17,000 feet the pilot let go of the stick to ensure that he could reach the alternate ejection handle. Due to the negative G force he was concerned about being able to do so. After finding he could reach the handle he again positioned the stick full forward and applied full left rudder and decided to hold these controls in until he reached 10,000 feet at which point he was going to eject. He had already told his RIO to prepare to eject.

At about 12,000 feet, the F-4J suddenly and abruptly came out of the spin in an 80-degree nose-low attitude. The pilot then commenced an easy pullout and relit the starboard engine. The pilot later said he "was reluctant to pull the advertised 19 units during the pullout for fear of reentering the spin." As a consequence when he finally leveled the aircraft out, under control, he was at 200 feet AGL. He stated that he "was not worried during the pullout and could have pulled out much higher if he had desired to do so."

The squadron C O commented on this incident as follows:

"This incident came within five seconds of being an accident. We are fortunate to have the airplane back on deck and the two crewmembers available for comment. In depth discussion with a spin expert at the Naval Air Test Center, Patuxent River, Maryland, indicates that:

- The pilot allowed the aircraft to become too nose-high, was slow in feeding in the rudder, did leave in pro-inverted spin controls as the aircraft negatively stalled, did not check his turn needle and once he recovered from the spin, allowed the aircraft to come perilously low to the water.
- The instructor RIO should have been quicker to recognize that the aircraft was far too nose-high, should have asked for neutral controls earlier, should have asked for the position of the turn needle and, once the aircraft was under control and the airspeed increasing, should have been more concerned than he was with the decreasing altimeter.

"That all of the above occurred even in the sanitized and controlled environment of the CRAW, with highly experienced pilots and RIOs in both aircraft, is interesting and germane. The fact is – and true in all of the out-of-control incidents I know of – that the crew of the aircraft were confused. They were also in this environment for the first time. But, as long as we fly the F-4 as a fighter we must continue to explore the near and far reaches of the envelope. The rudder reversal – though of limited tactical use – is a maneuver in one corner of the envelope that must be addressed in the training regime. Yes, once in a while, because it is flown incorrectly, the F-4 will proceed outside the envelope. Ten years of flying this machine has demonstrated, however, that the F-4 will fly out of practically any situation provided it is not aggravated. With prompt application of neutral controls (and forward stick) this near disaster would have resulted in a 'flip-flop' to a nose-low flying airplane. Even assuming that the airplane 'flip-flopped' to an inverted spin, proper rudder held against the turn needle would have stopped rotation.

"The point is, that as long as we consistently fly and fight the F-4 to its limits we will occasionally fly the machine out of the envelope. We must demand and hammer into every crewmember the proper procedures so that he automatically does the right thing when the aircraft does depart from the controlled flight or even better, before the aircraft departs." ◄

Short Snorts

Old engineers never die. As a rule they just slide away.
Ace L.

Jammed Controls

TWO pilots briefed for a local night instrument training flight in a C-1. Preflight and taxi were normal. The copilot laid his flashlight on the front part of the drop console (ledge between drop console and navigation chart stowage box).

During takeoff the rudder pedals felt stiff and the pilot initially thought he had just lined up in error on the duty runway as the plane was drifting from right to left on the takeoff roll. When large amounts of right rudder did not straighten the aircraft out the pilot thought a crosswind was contributing to the drift. At this point and with about 50 knots of airspeed the pilot decided the rudders were jammed or the rudder assist was malfunctioning (rudder assist was on). The pilot aborted the takeoff and tapped right brake to straighten the aircraft out to avoid running off the left side of the runway.

The aircraft was taxied back to the line where an inspection of the cockpit revealed the flashlight had fallen off the console and was lying beside the rudder pedals on the pilot's side. As a precaution the rudder system and rudder assist system were completely checked prior to the next takeoff.

A Real Blast

A C-141 preparing to depart a U.S. Navy facility was provided a "follow-me" truck to guide it to the runway for takeoff. After the aircraft taxied onto the runway, the "follow-me" truck drove behind the C-141 in order to return to the operations area – just as the pilot of the aircraft added power

Are You Getting Your FLIPS on Time?

IN spite of continuing efforts by the Aeronautical Chart and Information Center to insure delivery of FLIPS (Flight Information Publications) before their effective date, some users continue to experience delays in receiving them. In some instances, shipment delays occur off base. Carrier procedures and schedules may preclude delivery to the base receiver on weekends, holidays or after normal working hours. Tracer action by the Aeronautical Chart and Information Center may be required to determine the location of FLIP products.

Many times the cause of late delivery has been found to lie on base. When FLIP delivery requirements are not met, base operations should act promptly to find out where the shipment is located. Checks should be made of base transit procedures, step by step, beginning with the base transportation officer or postal officer. Because FLIPS are essential to flight safety, these products must reach aircrews before their effective date. Concerted effort on the part of base operations officers, transportation officers and all personnel involved in transit of these publications is needed to eliminate delays which occur on base.

for a rolling takeoff. As a result, the truck overturned and rolled over four times. Fortunately, no injuries were suffered but there was considerable damage done to the truck (see photo).

(Mis) Assumption

AFTER landing aboard an LPH the CH-53D was shut down and the maintenance troops took over. The rotor blades were to be folded but on the fold cycle, three blades would not fold. The fold cycle was initiated again and when the thumbs-up signal was given by the LSE *to the cockpit* the crewman on the rotor head assumed the signal was for him. He tripped the manual override and two blades fell to the deck. He had not checked the pitch locks IN prior to actuating the manual override. As a result the rotor head, three servos, the stationary scissors, rotating scissors and one rotor blade had to be removed and replaced.

Rotor Blades Trouble Antenna

LITTLE Boy, Little Boy, this is Angel, how do you read? There wasn't any reply. After two more calls and no answers the helicopter crew resigned themselves to continue the mission without radio contact. They circled the ship a couple of times to take a look and to decide how to effect the pickup.

The helicopter mission was to pickup an emergency medevac. The ship maintained just enough speed to make steerage and put the wind about 35 degrees off its starboard bow. The helicopter pilot knowing the job would be a tough one decided to hover over the bow. As the pilot maneuvered to place the hoist in position he was unable to maintain visual reference with the ship. The hoist operator notified the pilot he was drifting, but before the pilot could take a waveoff the main rotor blades struck a forward whip antenna. The pilot's immediate reaction was to slide away from the ship in case he had to ditch. However, he was able to maintain full control of the helo and returned to land safely aboard USS Flattop. Postflight investigation revealed each main rotor blade had been nicked and gashed or creased, but the blades had not come unglued. The ship antenna did not fare as well; two upper sections, about seven feet long, had been clipped off and fell over the side of the ship. There were no injuries.

This near catastrophe was prevented more by luck than by design. However, the incident is not new to helicopter flying by any means. Undoubtedly the first accident or incident of this kind occurred back in the heyday of the HO3S and has happened one or more times to every helicopter model since then. Personnel transfers, medevacs and cargo drops have been successfully conducted between helicopters and surface ships of every variety, but only by extra precaution, superb airmanship and lots of patience on the part of pilots and hoist operators. Helicopter pilots involved in missions of this type absolutely must maintain visual reference and if that reference is lost it's UP collective and the appropriate rudder to slide away from danger – muy pronto! A mission of this kind can be safely completed by resorting to an old trick. That trick is to put the transferee in a motor whaleboat, lower it over the side of the ship and move out about 30 yards. Even injured personnel in Stokes litters have been safely picked up this way. So the next time you're faced with a mission requiring precise maneuvers around a ship and you cannot maintain visual reference keep in mind the easy, safe way even if it does take an extra 20 or 30 minutes. ◄

The misunderstanding of hand signals can cause ground crew personnel to take actions which end in aircraft damage and/or personnel injuries. Know the proper hand signals and if someone uses a signal which is not correct, do not react. A thumbs-up signal is not the signal to actuate the manual override.

The subject of full autorotations in certain helicopter models arises from time to time. The author presents in this article some cogent reasons for a new look at this maneuver. Whether readers agree wholeheartedly or just in part, there is justification for serious consideration of the ideas which are discussed.

Autorotation Training

BY LCDR T. F. Doyle, Jr., USN

THE helicopter community is suffering a costly and needless loss of lives and aircraft because of the lack of training and practice in autorotations. Part of this problem may be due to questionable doctrine governing the execution of practice autorotations in operating squadrons and shore station SAR units.

A review of helicopter accidents from 1 January 1969 through 31 December 1970 has shown that there were 36 accidents wherein damage could have been lessened or prevented if the pilots involved had been proficient in autorotations. About two-thirds were in the H-1 model but there were one or more autorotation mishaps in all models. Realistic autorotation training is being inhibited by overly cautious policy and a complacent attitude among pilots regarding the need for continuing training. The introduction of large, sophisticated, twin-engine helicopters has helped foster this complacency. The solution is neither expensive nor complicated. It does, however, involve a reassessment of certain NATOPS restrictions and a new look at training procedures.

LCDR Doyle, who is now attending U.S. Naval PG School at Monterey, has had wide helicopter experience. He has served in utility, ASW and attack helicopter squadrons. He has personally experienced two actual emergencies – one daytime UH-1B engine failure and one nighttime SH-3D tail rotor drive failure. Both emergencies were terminated by no-damage, full autorotation landings.

It is acknowledged that certain models, H-3 and H-53, should not be subjected to practice full autorotations but authorization for full autorotations should be permitted, encouraged and practiced in the other models which constitute today's helicopter inventory. As for the H-3 and H-53, a more realistic policy for power recoveries for these models is needed. Importantly, autorotations should be regularly practiced throughout a prescribed percentage of that particular helicopter's H/V (height/velocity) envelope – including day, night and instrument conditions. Command should implement training procedures to ensure that each pilot remains proficient.

Autorotations are often considered to be just another routine standardization check-flight item to be completed. The standard procedure is to enter autorotation with plenty of altitude, airspeed and no loss of rotor RPM and recover without excessively frightening the check pilot. Maneuvering during autorotation to land on or recover over a particular spot is often neglected; yet helicopter pilots often have to fly over mountainous terrain and high density areas – where powerplant or tail rotor failure imposes very exacting demands, because of the necessity to reach a suitable landing spot within the gliding range of the helicopter. Throttle chops with UP collective at various attitudes and different airspeeds are nearly always neglected. Yet, who has ever had a powerplant or tail rotor failure in a single-engine helicopter at an opportune time? High-speed, low-altitude autorotations are seldom practiced even though many reconnaissance and attack missions require operating regularly in this environment. It is not suggested that service pilots get into H/V test work. What is suggested is that H/V diagrams be constructed for each model that would show areas of the H/V envelope where skill in the performance of autorotations is to be required of all pilots.

Correct procedures for practicing autorotations to land on a spot are important. The maneuver should be commenced at a relatively high altitude. During the descent the pilot should demonstrate his ability to autorotate at desired airspeed and RPM yet still position his aircraft for a recovery over, or touchdown on, a predetermined spot. The development of judgment in estimating how far the helicopter can glide and how this distance is affected by maneuvers is one of the important aspects gained in this maneuver. Demonstration of this capability requires skill, training, and practice.

There are a surprisingly large number of helicopter pilots who have not experienced a throttle chop with UP collective. They have little or no appreciation for yaw and rapid RPM decay. Generally 200 or 300 feet altitude is required for single rotor helicopters to regain normal rotor RPM after a throttle chop with UP collective. Wild maneuvers by the uninitiated, to regain RPM after actual engine failure, have caused more than one fatal accident. If the throttle chop is given when not suspected, the pilot is placed in a "real" engine failure situation. He learns about the yaw and fast rotor RPM decay and should be better able to institute corrective action under actual emergency conditions. Appropriate corrective action for rapid rotor RPM decay is vital and must

become second nature to pilots and it can only become second nature if it is fully understood and experienced many times under simulated conditions.

Low-altitude, high-speed autorotations are not as demanding as they seem – *as long as proper, corrective action is applied.* To begin the maneuver the throttle is rolled off with the collective at cruise power. After the throttle is chopped the nose is raised simultaneously and coordinated with lowering the collective. A landing attitude is maintained until airspeed dissipates and as the helicopter begins to settle, collective is used to slow the rate of descent until the helicopter touches down – either zero groundspeed or roll-on depending on the surface. This maneuver can also be done with power recovery instead of touchdown.

In most autorotations the flare is important. The amount of flare, speed of application and entry altitude vary with different situations. Judgment and skill must be developed by training, and then constantly honed. It should be noted that the flare is not necessarily an integral part of every autorotation. For example, a landing attitude may be assumed at about 200 feet and the landing cushioned entirely using collective. However, this technique requires considerable finesse in the use of collective. The no flare procedure also reduces the capability of the pilot to maneuver to a precise landing. Of the two methods the moderately executed flare is preferable.

Night autorotations should be practiced occasionally. The primary training value is the development of a working familiarity with the use of movable landing lights during descent and flare. A few night autorotations will develop an appreciation of having landing lights properly adjusted during night operations. One would probably not have time to adjust lights after engine failure below 1000 feet.

Some directives regarding autorotation training are overly restrictive. Restrictions against the widespread practice of full autos in single-engine helos, restrictions against the practice of night autos and the requirement, in the SH-3, to complete autorotations by 200 feet with power recovery all eliminate the real training value of the maneuver, particularly the latter because the last 50 feet, whether the auto is full or power recovered, is the proof of the pudding. There are certain skills to be learned in lining up, checking rate of descent and controlling rotor RPM and yaw during the last 50-100 feet that are lost when power is added at 200 feet. It is believed that the "power on at 200 feet" breeds misconceptions as to the helicopter's true performance. When the needles are married at 200 feet the aircraft, of course, is no longer autorotating. The rotor RPM movement is restricted by the engines. The pilot is not being trained in the precise rotor RPM control required for successful touchdown in real emergencies. If instead of the present procedure a smooth flare is commenced at 100 feet, full power can be applied while still in the flare at a point where ground speed/altitude are 20 knots/20 feet. This leaves plenty of time left for the engines to accelerate before UP collective is applied for power recovery. This procedure is much more valid for a training evolution than the application of power at 200 feet.

Widespread authorization of full autorotations in twin-engine helicopters is not advocated but for single-engine helos and the H-46 the situation is quite different. Opponents of full autorotations traditionally argue, "There's nothing to be learned in the last 10 feet." Not so! One of the most important things to be learned is the effect of forward speed and the increase in induced drag with decreasing rotor RPM. It is interesting to note that many autorotation mishaps are caused by improper touchdown speed. Thus it would seem that regular training in this area is sorely needed. There are other items of training interest in full autos, not the least of which is confidence building.

Full autorotations are just one concept of helicopter training which should be subjected to the scrutiny of modern management techniques – such as operations analysis. Is there a strong correlation between a pilot's autorotation proficiency and his potential helicopter performance? Perhaps a quantitative analysis would show it. Realistic autorotation training has a carryover to other facets of helicopter operations. A proficient pilot has a good chance of surviving all but the most catastrophic emergency. A pilot who regularly practices autos is continually conscious of rotor RPM, is mentally accepting the fact that an emergency may occur and is developing conditioned responses to deal with an actual emergency. An operations analysis may prove that the present policy of restricted and highly conservative autorotation training is a mistake. It is within the learning capability of the average pilot to land without damage (excepting rugged terrain) following simple powerplant or tail rotor failure if given a decent landing area within gliding range. It is believed that with increased pilot proficiency in the autorotation maneuver through realistic training the helicopter major accident rate could be decreased.

There are two methods that could permit a higher level of autorotation proficiency training without increasing flight time. A training program can be achieved by helo aircraft commanders utilizing an occasional few minutes of flight time at the end of operational missions as well as training flights. Autorotations, for example, take only about 20 seconds!

The other proposal is the suggestion that flight time for autorotation training be extracted from part of the block of time allocated for airways flight proficiency. Care must be taken to distinguish instrument flight training from airways training. To say, however, that a helicopter pilot must have the same proficiency in flying IFR cross-country flight as fixed-wing pilots is stretching a point. Helos are poorly designed for IFR airways flights and seldom is there a military requirement for such flights. With the present state-of-the-art of helicopter deicing equipment helicopters are, and will be, for the foreseeable future unable to operate on airways during the winter, throughout a large part of the U.S., where there is visible precipitation and low freezing levels. Actually, helicopters nearly always go under the weather. In eight years I have never flown a military mission on airways except for completing annual requirements for an instrument card. Shipboard operations require low level IFR flight and approaches, hence helicopter pilots require tactical instrument training including marshall procedures, tacan approaches, GCAs and CCAs. However, the present system of equating helo pilot instrument needs to the needs of other pilots is perhaps depriving helo pilots of much needed training in other areas.

An increase in expertise in autorotations is not a panacea for all mishap causes. Other important areas need attention, such as operations around non-aviation ships, obstacle clearance practice and high terrain operations. However, an increase in autorotation proficiency is available for the asking. If there's one thing fairly certain, it is that for the remainder of the seventies helicopter procurement will increase, so let us benefit fully from the unique survivability of this aircraft by a fresh look at our autorotation policies and training programs. ◄

"This article does not necessarily reflect the opinions of COMNAVSAFECEN but is presented for discussion." – Ed.

The Assumption Syndrome

A MINOR aircraft handling accident onboard a CVA provides a focal point for discussion of what one commanding officer labels the "assumption syndrome." The damage to the aircraft was not discovered until some time after it had occurred. Then everyone concerned tried to figure out how and why it happened. The circumstances of the mishap could not be positively determined, but it was *assumed* to have occurred on the 29th day of the month during an aircraft respot on the hangar deck. Fortunately, the damage to the aircraft was relatively minor but the commanding officer attributed this to luck more than anything else. After a formal mishap report was submitted, the CO addressed some informal but very pertinent comments to the personnel involved. He stated:

"The damage is *assumed* to have occurred on the 29th – but the results were not actually discovered until the first. Why?

"The aircraft was scheduled for at least two sorties and it was supposedly preflighted and inspected by plane captains and pilots on the 29th. Apparently, we must *assume* that the inspections were not made with sufficient thoroughness to confirm that the damage did *not* occur prior to the 29th. When did it happen?

"The comments of the aircraft handling officer, squadron personnel, air boss and CAG concerning the mishap are all pertinent and valid and I have no quarrel with any points raised in the various endorsements. However, all of these highlight the simple fact that:

(1) The supervisors *assumed* that competent direction was being given to the individuals making the respot of aircraft. Was it really?

(2) The plane handlers *assumed* that someone was supervising – and that someone was watching where the tail of the aircraft was going. Were they?

(3) The handlers *assumed* that someone was in a position to see where the aircraft was going and also *assumed* that someone would give some warning if an unsafe situation developed. Were these valid *assumptions*?

"Through sheer chance, this mishap proved less costly than it might otherwise have been. We were lucky. We had another relatively painless opportunity to learn an old lesson: *You can't ever assume anything except responsibility for doing things right!*" ◄

'What

"Well, you see it was like this, Trooper – I got caught in the middle of traffic on the Hollywood Freeway and this was the first turnoff I could make."

Those who command and man Navy ships have long been known for their ingenuity, but one example involving USS INDEPENDENCE (CVA-62), USS AMERICA (CVA-66) and USS FORRESTAL (CVA-59) is deserving of special mention. At the request of the carriers and through the cooperation of the Virginia State Highway Patrol a state trooper was sent off to the Med to ride each of the ships home after their deployments. What the troopers accomplished during the time they were aboard is best described in the news release promulgated by the Independence. It is published below, in its entirety, because it represents a traffic safety educational tool available to ships wherever they might be homeported.

ABOARD THE USS INDEPENDENCE – December 1970 – The long arm of the Virginia State Police stretched across the Atlantic Ocean and escorted the Navy's attack aircraft carrier USS INDEPENDENCE (CVA-62) home to Norfolk from its recently completed seven-month cruise in the Mediterranean Sea. The "arm," requested by the Navy, was in the form of State Trooper C. R. Wilmore and was part of a six-month-old safe driving program aimed at minimizing traffic accidents among sailors returning from overseas.

Four times a day for the last five days of the INDEPENDENCE's trip home, sailors gathered in groups of 100 or more to receive a hard-hitting, factual presentation of statistics, followed by a film of bloody highway accidents. In addition, the ship's closed circuit television was used to reach men who missed the lecture.

The INDEPENDENCE was the third Norfolk-based carrier to participate in the Joint Navy-Virginia safe driving program. Both the USS FORRESTAL (CVA-59) and the USS AMERICA (CVA-66) hosted members of the

Virginia State Trooper C. R. Wilmore presents a safe driving lecture to members of the Navy's attack aircraft carrier INDEPENDENCE.

a Great Idea!'

State Highway Patrol during their Atlantic crossings from the Med.

Trooper Wilmore said he was very pleased with the program on the INDEPENDENCE. He said that attendance was excellent and the response great. "If every man remembers only one point made during the presentation and drives more carefully, I'll feel that my time was well spent," he said.

The program is viewed optimistically. A similar program initiated in California in 1964 resulted in 40 percent fewer traffic incidents involving sailors returning from extended overseas deployments.

Trooper Wilmore, a veteran of 12-and-a-half years with the Highway Patrol, is a resident of Charlotte Court House. In addition to presenting the safe driving lectures, he was continually beseiged with questions concerning new traffic laws, vehicle licensing and registration and driver's licenses.

During his free time, Trooper Wilmore toured the 80,000-ton ship and was "amazed" by carrier operations. "Everyone in America should be able to see this," he said. "It makes a person a little prouder of our country to know that we have ships like this and men who work so hard on them."

He commented that, "It would really be a shame for a man to work so hard under such hazardous conditions as those on a carrier's flight deck and then end up as a highway statistic shortly after getting back to the States." ◄

Faces of sailors and marines aboard INDEPENDENCE grimly reflect the lessons of a joint Navy-Virginia safe driving program.

Captain G. G. O'Rourke, INDEPENDENCE CO, might be saying, "But honestly, Trooper Wilmore, CNO said we could exceed 16 knots."

THUNDERSTORMS: NEVER AGAIN!

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT, PREVENT AN ACCIDENT

I'M an experienced aviator with 1700 hours flight time – almost all in jets. In my career I have gone into three thunderstorms. After each one I said the same thing – NEVER AGAIN!

I relate my latest hairy tale in the hope that one more warning will influence someone against flying into a thunderstorm voluntarily.

My first two trips into old cumulonimbus were in single seaters with no radar. Now that I'm in *Vigilantes* with a crewman and a super radar to assist, I figured avoiding "bumpers" would be no sweat. Not so, as I found out recently while returning from a mission. There was a line of thunder squalls between the final target and home and we had been doing fairly well avoiding the buildups by using the radar. Finally, however, we ran out of clear air. The line was V-shaped and we were headed for the apex. My navigator said the point showed as a clear or very thin area so I decided to cross there. It even looked reasonably clear. No sooner had we received a clearance than we were in it. There was turbulence, blackness, precipitation drenching the canopy and a roaring noise so loud I thought both engines were coming apart. It was difficult to stay upright much less follow approach control instructions. It was in a word – TERRIFYING!

After what seemed like hours in the black pit, we broke out of the clouds into beautiful, clear weather with the base only 15 miles away. *Total actual time IFR – about point one.* Damage was limited to a broken TV scanner and canopy sealant which ripped off.

So to all of you with more time or less time in the air, let my tale be the one to induce you to avoid thunderstorms. If at all possible go somewhere else. The most

important thing isn't getting back to your home base – its getting down safely at any airfield. Don't put yourself in the position where you have to say, "NEVER AGAIN."

(Usually three strikes are out. Suggest you hold what you've got. – Ed.)

Showoff

ON a recent flight of an S-2C, on airways, in the Mediterranean area, the pilots caught sight of another aircraft, an F-4. The weather was VFR for the most part and the S-2C pilot noted that the F-4 was in a turn which could bring the two aircraft in proximity to each other. The F-4 continued to climb above the S-2C and disappeared behind the port wing. After a few minutes, the F-4 was spotted slowly passing, flying wing on the S-2C. The F-4 was sufficiently distant that there was no cause for alarm, so the S-2C pilots watched the F-4 and continued on their way. After the F-4 had overtaken the S-2C, the F-4 suddenly cut in front of the S-2C and commenced a steep climb rapidly disappearing from view. The S-2C, which had its autopilot engaged, flew into the slipstream of the F-4 and rolled 90 degrees to port with a violent pitchup and then a pitchdown. The uncontrollable *Stoof* bounced around for a few seconds before it was brought under control.

If situations such as this continue, in which a pilot must demonstrate his capability and that of his aircraft in an unauthorized manner, a serious mishap will occur. In the very least, the annoyance and anxiety factors are not appreciated by the pilots of nonparticipating aircraft.

Anymouse

Sounds as if the F-4 pilot succumed to a juvenile urge to show off. It's great to have pride in being an aviator but this pride should be displayed in a professional manner. Showing off doesn't meet professional standards and must be discouraged by all.

Acceptance Checks Are Revealing

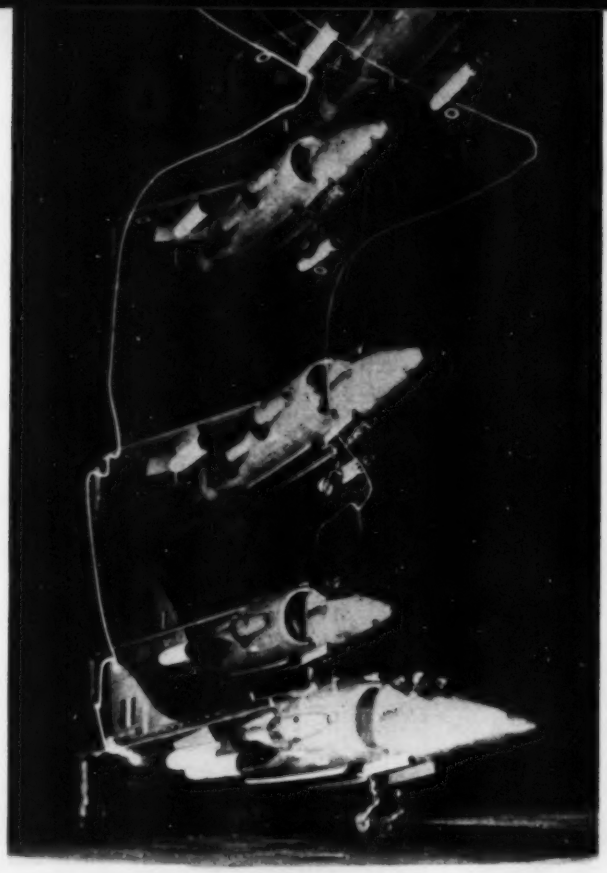
RECENTLY our squadron sent a crew to NAS East to ferry home a P-3B. While inventorying this aircraft I noticed discrepancies such as broken clocks, electronics gear adrift, oxygen bottles overdue for inspection and missing items which were not specifically on the inventory record. It *appeared* that the aircraft had been used as the "spare parts depot" and neglected in many ways. During preflight the main landing gear tires were found to have marginal amounts of rubber remaining. We requested that one tire be changed before departing because a landing was to be made at another base enroute home. Their maintenance personnel inspected the tire and refused to change it – claiming it was "within limits." In order not to make an issue of the matter our pilot accepted the aircraft and we ferried it home without incident. However, after landing back home it was determined that all six tires had to be changed because of excessive wear. I feel that until an aircraft is transferred it should be maintained in the same way as any other aircraft – that is change what needs changing to keep its status UP. The pilot must always depend on the reliability of the maintenance man for his safety but the maintenance man's reliability is largely dependent on the squadron's sense of responsibility. We don't need an accident to remind us of this!

Electromouse

You are so right! It is unfortunate but true that generally aircraft transferred between activities are not in the best of condition even in newer models like the P-3B. Material and data are being gathered concerning the number of discrepancies occurring in transfer aircraft for an article on this subject in the near future. ◄

What aircraft can take off *vertically* and accelerate to 600 knots (level flight) in 72 seconds or climb to 35,000 feet in 122.5 seconds or 40,000 feet in 142.5 seconds? These are some of the capabilities of the –

AV-8A, *Harrier*



THIS versatile, rugged jet aircraft is the first pure jet V/STOL aircraft in the Navy and is being operated by VMA-513 at MCAS Beaufort, S. C. It has a single twin-spool Rolls Royce Pegasus 102 turbofan engine rated at over 20,000 pounds of thrust. When the Pegasus 103 engine becomes available, it will produce 21,500 pounds of thrust. The aircraft manufacturer is Hawker Siddeley Aviation Limited, Kingston Upon Thames, Surrey, England. The aircraft has swept wings, swept tailplane, single vertical fin and rudder and four engine thrust nozzles which are controlled by the pilot and can be deflected to any position between zero degrees (parallel to the longitudinal axis) and 98 degrees for transition or hovering flight. It has one main landing gear, a nosewheel and two outriggers (one under each wingtip).

In flight the nosewheel and main landing gear retract internally and the outriggers fold up parallel to and aft of the wingtips. In the V/STOL mode, axis control (pitch, roll and yaw) is obtained by thrust valves at the aircraft extremities and mechanically connected to the various control surfaces. Figure 1 shows the plumbing and mechanical hookups of the thrust valves. These valves emit bleed air from the engine hot section. The vectored thrust of the AV-8A engine permits a high degree of maneuverability (similar to a helicopter) and since the thrust resultant is through the aircraft's center of gravity, stability problems are minimized. The *Harrier* can take off and land vertically (usually) or with a short run or roll (frequently) or in the conventional free run or roll (rarely).

The *Harrier* is a single-seat, transonic close-support aircraft. It is similar in size, weight, fuel and ordnance capacity to the A-4 and any A-4 pilot will feel right at home in the AV-8A cockpit. The *Harrier* is reputed to be docile at high speeds and gets well into the buffet zone at all speeds and altitudes before the wing stalls – very comforting for high-speed, low-level flights. It has single point refueling, five weapon-pylon stations and can carry

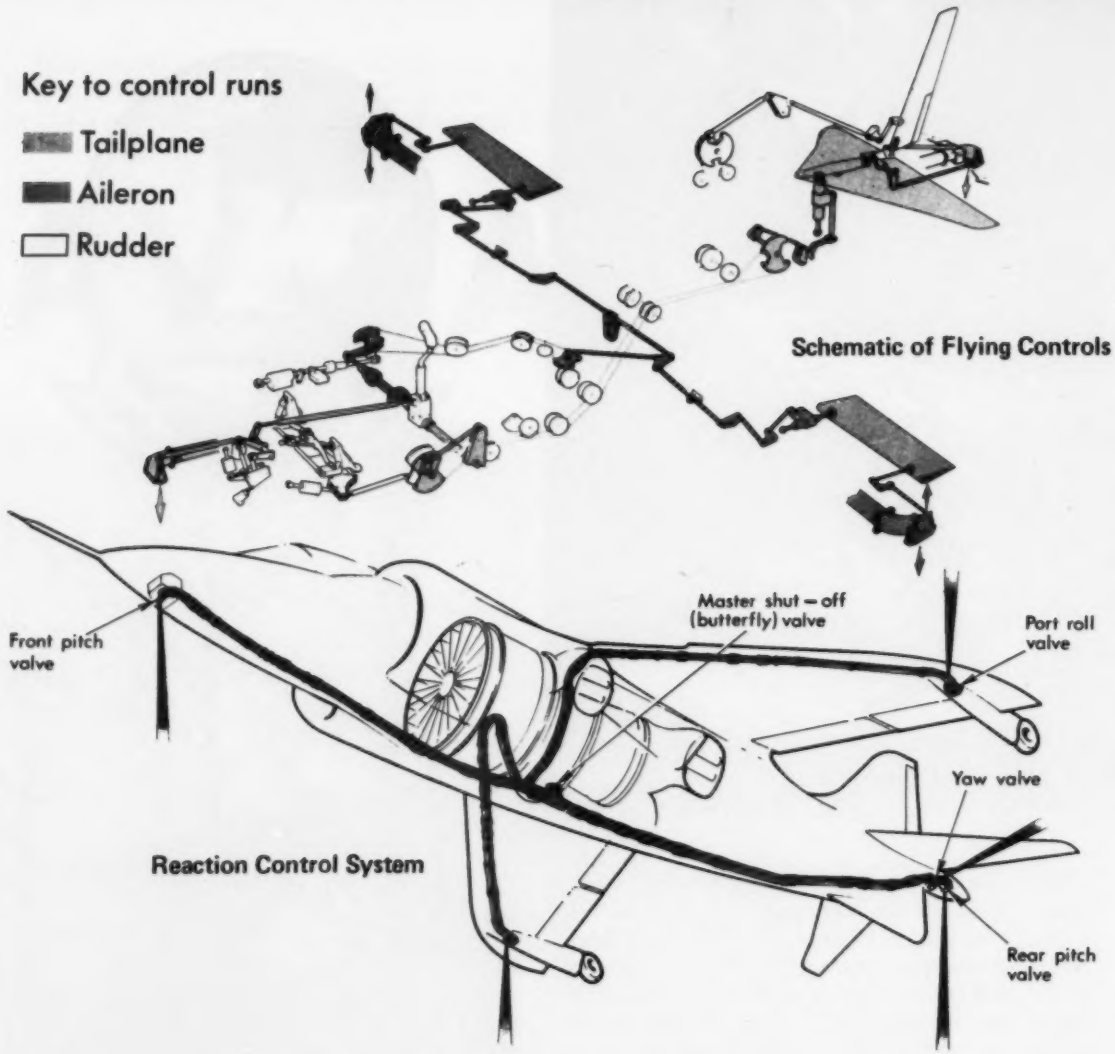
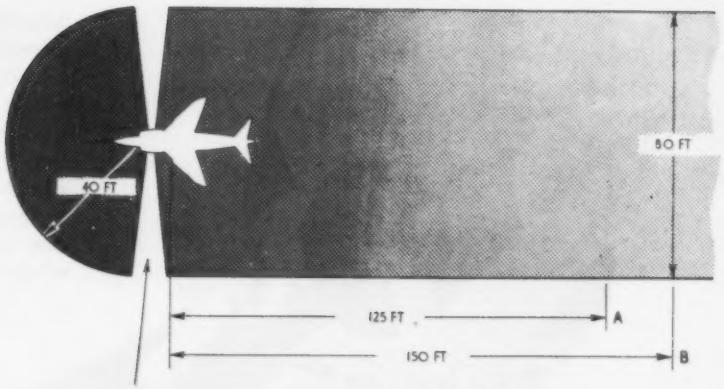


Fig. 1

bombs, rockets, 30 mm. guns, reconnaissance pods, flares or external tanks. It has IFR (in flight refueling) capability and with this capability has flown as much as a seven-hour flight. It cannot take off vertically with a maximum load but can launch in this condition with a very short run – under 1200 feet on a hot day. For landings it cannot land vertically in zero/zero conditions but the pilot can transition, once the airport is in sight, from forward flight into a hover in about 1000 feet. Wet and slippery runways pose no hazards to this bird since it seldom takes off or lands conventionally. One can well imagine with the wide outriggers how stable this aircraft is to taxi – quite a contrast to the A-4. It can taxi over unimproved ground and operate off unimproved areas with ease; however, risk of FOD to the engine is extremely great. Thus a prepared surface is preferred.

The *Harrier* has successfully operated off CVAs and LPHs and can fly from any ship having a helicopter platform large enough to accommodate H-3s, H-46s or H-53s. The British have also operated *Harrier* from many ship decks and in the field from many and varied sites with excellent results. The versatility of this aircraft with its vertical and short takeoff capability will permit amphibious assault forces to have their own close support aircraft just as they now have both amphibious and helicopter troop and supply lift. The possibility of continuous close-support protection with the AV-8A for an amphibious landing staggers the imagination. During the initial landing and while operating from ship decks the *Harrier* can operate within a few minutes flight of the beach and after the beach has been secured the



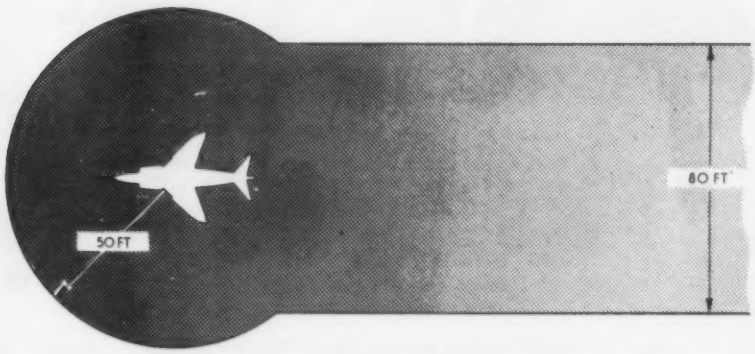
SAFE AREA

THIS AREA MAY BE OCCUPIED WITH CAUTION FOR STARTING AND FOR ADJUSTMENTS WHEN GROUND IDLING ONLY. (NOZZLES AFT)

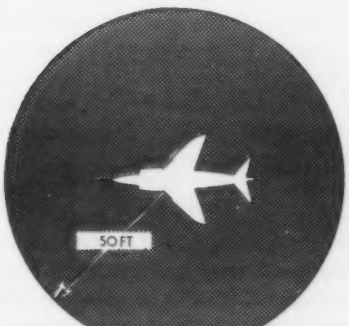
A TEMPERATURE DROPS TO 50°C

B DANGER FROM FLYING STONES AND EARTH SPEED DROPS TO 30 KNOTS

NOZZLES AFT TO 45 DEG. DOWN



NOZZLES FROM 45 DEG. DOWNWARDS



NOZZLES DOWN

NOTE

PERSONNEL SHOULD AVOID BEING OUT OF THE PILOT'S VIEW DURING VERTICAL TAKE OFF, VERTICAL LANDING OR HOVERING UNLESS THEY ARE BY A FIXED OBSTRUCTION KNOWN TO THE PILOT

Fig. 2

Harrier can move ashore – still only a few minutes flight from the action. Shades of Pelelieu!

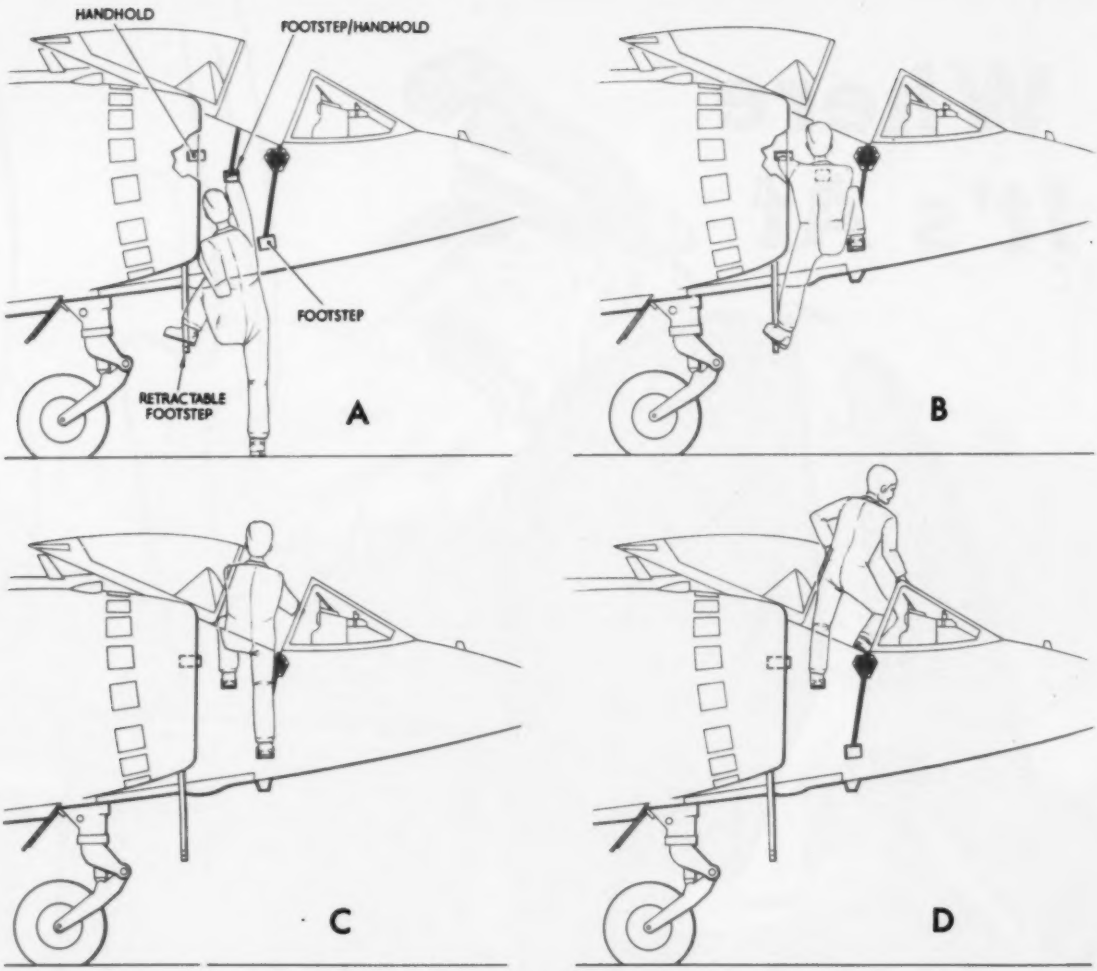
Since the AV-8A is a single-seat aircraft, pilots have more responsibilities and more duties for the ground safety of the aircraft – particularly when away from Homeplate. They will have to postflight the aircraft since there are few, if any, linemen at air stations qualified to do the job. The pilot is charged with the responsibility for inserting seat pins, installing downlocks and gear pins, supervising refueling and servicing and of course, when ready for departure, the pilot must reverse this procedure and pay particular attention to brief the fire watch and the taxi director. *The chocks are removed before start* because once that Pegasus engine is burning there is virtually no safe area within 50 feet in any direction! If the engine is at idle

and if the thrust nozzles are less than 45 degrees there is a very small safe area, *for those who know*, aft of the engine intakes and forward of the wing. The danger area around the aircraft is shown in Fig. 2 and it is easy to see that anytime the aircraft is approaching to land or is ready for takeoff that no one should ever be behind the aircraft. Personnel, particularly those who are helicopter oriented, must be alerted to the dangers of the downwash and heat behind and below the *Harrier*.

The AV-8A operates on JP-5 fuel and 23699 oil; however, it can operate on JP-4 if JP-5 is not available. The *Harrier* has two 3000 psi hydraulic systems and two separate a.c. electrical generating systems (230 volt, 400 hertz) with d.c. requirements being provided by TRU (transformer rectifier units) operating from the main a.c. supply. Battery-supplied d.c. power is provided for the self-contained engine starter. What a boon to line personnel! No air or power hookups required! A small emergency battery provides power to essential flight instruments in the remote possibility that complete electrical system failure might occur.

A vertical takeoff is performed by keeping the thrust nozzles aft to minimize ground erosion or exhaust gas recirculation. Power is set to the highest level (55 percent) without forward movement; then the nozzles are deflected to 81 degrees and the power is rapidly increased until liftoff occurs. Transition is accomplished by leaving the throttle open and moving the thrust nozzles progressively aft. The aircraft smoothly and quickly picks up aerodynamic lift to compensate for the loss of jet lift. The response is like – *now*. One test pilot said, "To the unsuspecting pilot it would appear more like being catapulted from an aircraft carrier." In almost the reverse procedure a vertical landing can be made. Transition from forward flight to a hover is made from a normal approach attitude (8-10 units AOA). When a position of about 1000 feet short of the landing spot is reached the thrust nozzles are deflected to 98 degrees. As speed drops off the throttle is gradually opened to provide jet lift to replace aerodynamic lift and the nozzles are placed at the 81 degree position. The aircraft is landed, the throttle is reduced, the thrust nozzles are placed aft and the pilot is ready to taxi or shut down as the situation dictates.

What about instrument approaches? A piece of cake! One demonstration of the capability of the AV-8A was conducted with a 750-foot ceiling and two miles visibility. The aircraft was intentionally flown 200 feet too high on the glide path, 30 knots too fast and almost off the scope laterally. When the pilot became contact he deflected nozzles down, descended to the glide path, turned to the centerline and made a roll on landing on the intended touchdown point at less than 100 knots. The plane came to a stop in a few hundred feet without the pilot touching the brakes or popping a drag chute. The pilot could have come to a hover and landed



Diegram shows the approved method of cabin entry and exit.

vertically if he had so desired.

Harrier operations at Navy and Marine air stations are not without some problems. For example, despite the *Harrier's* capability of vertical or short landings it is a fixed-wing aircraft and until an agreement is executed between the Navy and FAA, tower controllers must treat it as such. This means that a pilot of the AV-8A cannot be legally cleared to land on an off-duty (intersecting) runway when other fixed-wing traffic is operating on the duty runway.

Until the operation of the *Harrier* becomes commonplace, imagine the consternation in the tower when pilots make calls to the tower such as:

58385: Norfolk tower, this is Marine jet 58385. Request permission to land at the intersection of runways 10/18?

Tower: 58385, the duty runway is 10. You what? Say again.

58385: *(Casually)* Desire vertical landing . . .

Tower: 58385, what is your present position and altitude?

58385: *(Casually)* I'm in a 50-foot hover over the south boundary of the field.

Tower: 58385, wait one. (Hey chief, come here! Some guy is trying to blow my mind.)

In summary the AV-8A *Harrier* can best be described in the words of one veteran pilot, after a demonstration ride in a two-seater version; "My first impression of flying the *Harrier* is one of old age – that this aircraft has come 10 years too late for me! This puts the fun back in flying." Ah, so!

An extensive article on the hazards of Harrier ground handling is being prepared for printing in the Fall issue of MECH. It will contain detailed information on how to service this revolutionary aircraft in the safest manner possible. – Ed. ◄

Where It's At

IN the days of the first war there was a squadron leader named Major Olcore, known for his intolerance of young aviators. He had been with aviation since its inception and had learned to fly by the seat of his pants. He had little patience with the younger generation who, he felt, spent too much time reading engine manuals and performance estimates, and too little time testing and proving their ability in the air. He had no doubt of his own airmanship and spent much time telling the new breed about his thrilling exploits and advising them to "Get out there, fly that craft, bend it around, become a part of the machine, and maneuver it with gut-feeling . . . not with stupid rules and figures in all those books."
It came to pass that the
squadron
with a ne
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PRANG!
squadron aircraft were replaced with a newer, heavier model, the first three of which arrived by truck, as was the custom in those days. When the wings were firmly bolted to the fuselage and the engine serviced, the first craft was ready to fly. Meanwhile, there had been considerable talk about the hill at the end of the runway being a bit of an obstacle for the new bird due to its weight and possibly longer takeoff roll. The major was disdainful of this talk, saying, "If you can fly one of them you can fly them all." Still the talk persisted. A thread of doubt formed in the major's mind but he certainly couldn't back down on any previous statements.
The major himself was willing to give it a try except for one thing, he had a leg in a cast (from his last accident) and the panty-waisted flight surgeon had grounded him. So he designated Lieutenant Newly to make the first takeoff.
Newly balked.
Not wishing to deal with any near-mutiny, Olcore relied on his gift of verbal persuasion. He decided to produce some extra lift in the air with a phenomenon he had discovered a few months past.
"Warm air has more lift than cold air. I discovered this during a low level encounter in which I shot down three enemy planes. I was momentarily being pursued by all three bandits and was seeking an altitude advantage. As I flew from the shaded side of a mountain to the sunny side, my craft was suddenly lifted higher and I was able to destroy all three attackers with my usual deadly accuracy. All because warm air has more lift."
And so it was that the mess cook was instructed to boil ten large pots of water. These were aligned near the runway end at the base of the hill. An aircraft engine was rigged by Major Olcore to blow the hot air across the runway as Lieutenant Newly made his takeoff run.
The aircraft burst into flames as it crashed into the hill.
"He ham-fisted it," cried Major Olcore, "I could have done it easily!" The major was, as he had been from the beginning, blowing hot air.

(Moral: Hot air is found everywhere, but performance data is found in the NATOPS Flight Manual.)

PYROTECHNIC SIGNALS FOR PILOTS.

tab illus
(also cutaway)
26-31

HELO searchlights pierce the black night over a choppy ocean. In the distance the lights of a carrier are visible. Suddenly in the darkened interior of the helo a crewman calls out, "Flare sighted at two o'clock." The pilot pinpoints the position and the helo proceeds to the rescue. The survivor will soon be deposited safely on the flight deck. At the same time, halfway around the world a signal bursts through a jungle canopy and is spotted by the crew of a *Jolly Green Giant.* Thanks once more to pyrotechnic signals, another Navy aircrewman is rescued to fly again.

Pyrotechnics may not be the safest thing to set off at your backyard Fourth of July cookout, but in a survival situation they can be your best means to attract your rescuers' attention.

Basically, Navy pilots and aircrewmen carry three kinds of pyrotechnic distress signals – the familiar Mk-13 Mod 0 marine smoke and illumination signal, popularly known as the "signal flare"; the Mk-79 Mod 0 illumination signal kit or "pencil flare gun"; and the Mk-130 series signal cartridge. In addition, a 9 mm. signal round which comes in red, green and yellow is also available but is generally much less used.

Mk-13 Mod 0 – This device is used for either day or night signaling. As everyone should know, it emits orange smoke for day and red flame for night. Burning time for each is approximately 20 seconds.

This signal consists of a metal cylinder approximately five inches long and slightly more than 1.5 inches in diameter. Each end is fitted with a protective plastic cap. The old type Mk-13 has bumps on the night end of the cylinder for identification by touch. The new flare has, in addition, three large bumps molded on the plastic cap end. The plastic cap on the day end is smooth.

Under each plastic cap, there is a pull ring with a nylon cord or lanyard tied to it. A large washer on the cord at the night end provides additional identification in darkness. The pull ring at each end is attached to a pull strip seal which, in turn, is attached to a friction wire. The friction wire extends inward through a pull wire-ignited cup containing an ignition composition. A sharp, quick pull on the pull ring initiates the process which ignites the flare mixture.

The label on the Mk-13 Mod 0 gives you instructions for its use but who can read in the middle of the ocean or the woods during darkness? It would be best to know

TO IGNITE SIG
1. REMOVE CAP FROM E
2. FLIP PULL RING OVE
3. PUSH RING DOWN
4. IF SEAL DOESN'T BR
UNTIL IT BENDS AG
5. FLIP BENT RING BA
TION AND USE AS
6. IGNITE SIGNAL BY
FOR NIGHT USE
IDENTIFY PLANE BY

The Mk-13 Mod 0 Marine Smoke and Illumination Signal is perhaps the best known piece of personal signaling equipment in naval aviation. The latest model shown here has bumps molded into the plastic cap of the night end to identify it by touch. In addition, a washer is tied to the night end cord.

the whole procedure by memory. The operating instructions are:

1. Tear the paper or plastic cap from the end to be ignited.
2. Flip the pull ring over the signal rim.
3. Push the pull ring downward to break the seal.
4. If the seal does not break, continue to push the ring downward until it bends against the case.
5. Flip the bent ring back to its original position and use it as a lever to break the seal.
6. After the seal is broken, ignite the signal with a quick pull on the ring. Be sure that the firing end is not pointed toward your face or body.
7. Hold the signal firmly at arm's length at an angle 45 degrees from the horizontal (downwind) to prevent burns from molten residue.
8. If the smoke signal flames, douse it for a moment. The smoke will resume after immersion.
9. After using one end, douse the signal in water to cool it and save the remaining end for future use if required.

Mk-79 Mod 0 illumination signal kit – This kit consists of one Mk-31 Mod 0 projector, a plastic bandoleer containing seven Mk-80 Mod 0 signals and an instruction sheet. (See Fig. 1, next page.) Again you won't have time to read the instruction sheet when the helo appears on the horizon so know the operating procedures thoroughly *before* the emergency. Each of the signals contains a red pyrotechnic star. On activation, this star is propelled upward to a height of 250 to 650 feet and burns for a minimum of 4.5 seconds. Although no absolute service life has been established for the Mk-79 Mod 0 kit, it should be serviceable for a minimum of five years from the date of manufacture.

The device functions by releasing a firing pin so that it strikes a percussion primer in the base of the signal. The primer ignites a black powder expelling charge which ignites the first fire composition of the star and propels the star upward.

Here's how you operate the Mk-79 Mod 0 components:

1. Remove the bandoleer and projector from the plastic envelope.

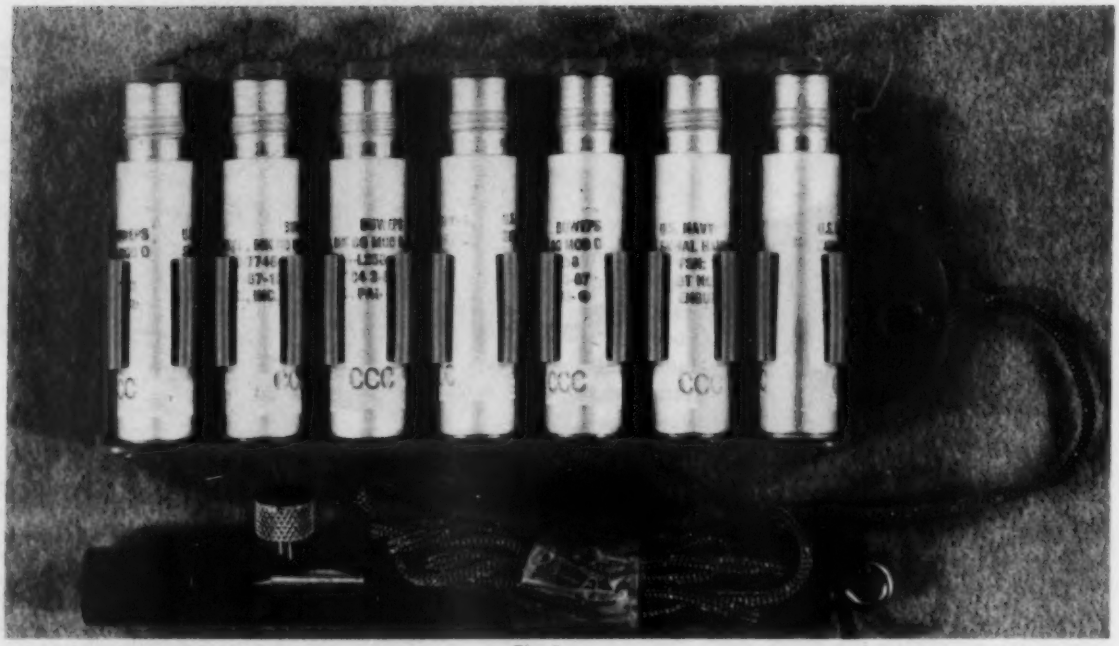


Fig. 1

The Mk-79 Mod 0 Illumination Signal Kit contains a Mk-31 Mod 0 projector and a plastic bandoleer containing seven Mk-80 Mod 0 signal cartridges.

2. Cock the projector firing pin by moving the trigger screw to the bottom of the vertical slot and slipping it to the right so that it catches at the top of the angular safety slot.

3. Bend the protective plastic tab away from the signal in the bandoleer to allow attachment of the projector. *The plastic tabs over the signals in the bandoleer protect the percussion primers from being struck accidentally. They should be kept intact until just before loading the signal into the projector.*

4. Mate the projector with the signal and screw the projector in clockwise until the signal is seated.

5. Hold the projector over your head with your arm fully extended. Point the projector at a slight angle away from your body.

6. While firmly gripping the projector, fire the signal by slipping the trigger screw to the left, out of the safety slot and into the firing slot. This action should be one continuous movement so that your thumb does not interfere with the forward motion of the trigger screw when it is brought into the firing slot.

7. If the signal fails to fire, try again to fire it by depressing the trigger screw to the bottom of the firing slot with your thumb and releasing it quickly.

8. Unscrew the spent signal case or signal which has failed to fire and throw it away.

9. To fire another signal, repeat the same steps.

Never *under any circumstance* point a loaded projector toward yourself or another person.

The Mk-79 Mod 0 kit calls for special storing and handling safety precautions. It should be stored in a dry, well-ventilated place shielded from the direct rays of the sun. Keep your signals away from fire and other sources of heat. *Careless handling can cause accidents.* The signals are ignited by percussion primers which must be protected against being accidentally struck. The protruding tabs of the bandoleer, which extend over the signal bases to prevent inadvertent striking of the primers, must not be torn off or bent back except when loading a signal into the projector. *Do not load the projector until immediately before firing. A signal loaded and not fired immediately should be returned to the bandoleer.*

Inspect your signals periodically to make sure that they are not dented or otherwise damaged. Dented or damaged signals should not be used. Such imperfections can result in a violent reaction when the signals are fired.

You should check the projector trigger screw frequently to make sure that it is tight. A loose trigger can release the firing pin prematurely and cause injury or it can easily be lost. If this happens your projector is useless. (A crewman did, however, report recently that after parachute descent he fashioned a workable trigger for his pencil flare gun from a fish hook in his survival kit. He just happened to have a crescent wrench along with him.) When you fire the projector, be sure you raise your arm well above your head and hold the projector in a vertical position. *Never point a loaded projector toward yourself or another person.*

Mk-130 series signal cartridges – These cartridges are fired from a standard .38 caliber special revolver. The Mk-130 is a red signal (see Fig. 2); the Mk-138 is green; the Mk-139 is yellow and the Mk-140 is green and red. Each of the signals is color coded by a 3/16-inch band around the projectile case. The nose of the Mk-130, 138 and 139 cartridges is either white or "natural" and the nose of the Mk-140 is green. The propellent charge can project the signal display to an average height of 1700 feet where there is no obstruction. The signal can penetrate all normal jungle canopy except for tree limbs of considerable size.

These cartridges are loaded into the chamber of a revolver just like ball ammunition and then fired the same way. Because of the relatively high muzzle velocity, you can aim them at an angle of 90 degrees from the horizontal. *(SAR units recommend such an angle of fire to assist in location of survivors. – Ed.)* But because of their ballistic characteristics, they are not suitable for use as a defensive weapon at ranges exceeding 50 yards.

The displays of Mk-130, 138 and 139 cartridges appear as streaks extending from the point of firing throughout the total trajectory. Because of a built-in ignition delay, the Mk-140 signal display travels 50 to 80 feet before it becomes visible. Each signal burns for 6 to 7.5 seconds. The Mk-140 is green for approximately 3.3 seconds, then it burns red for approximately 3.6 seconds.

Handle these signal cartridges as carefully as you would any other ammunition which is initiated by a blow on a percussion-type primer. Avoid dropping the cartridge or otherwise striking its primer with any hard object. *Under no circumstances should a loaded sidearm or signal device be pointed toward friendly personnel.*

9 mm. signal cartridges – These are the Mk-121 Mod 0, a red signal; the Mk-122 green, and the Mk-123 yellow, which are fired from a semiautomatic 9 mm. sidearm and can be used for nighttime signaling. The cartridges are color coded by a 3/16-inch band around the projectile nose.

A primer ignites the ball-powder propellent charge which projects the signal to an average height of 1650 feet with enough force to insure an effective display

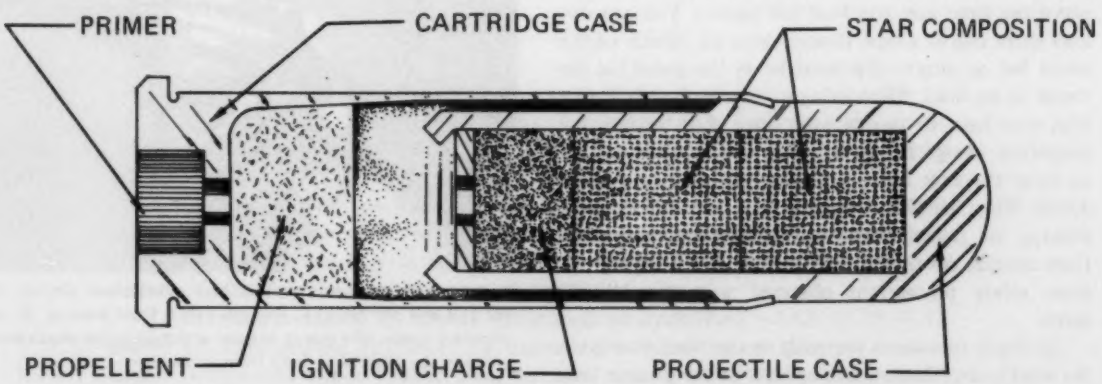


Fig. 2
Signal Cartridge, Mk-130 Mod 0 (Red).

Hand-Manipulated Signaling Devices Summary

Item	Launched From	Display	Burn Time (sec)	Min Alt (ft)[1]	Max Lg. (in.)	Max Diam (in.)	Approx Weight (oz)
Signal, Smoke, and Illum, Marine, Mk-13	Held in hand while functioning	Day: orange smoke; night: red flame	20	---	5.18	1.63	6.4
Cartridge, Signal, Mk-130	.38 cal. special revolver	Red streak	5.5 – 7.5	800	1.55	0.379	0.39
Cartridge, Signal, Mk-138	.38 cal. special revolver	Green streak	5.5 – 7.5	800	1.55	0.379	0.39
Cartridge, Signal, Mk-139	.38 cal. special revolver	Yellow streak	5.5 – 7.5	800	1.55	0.379	0.39
Cartridge, Signal, Mk-140	.38 cal. special revolver	Green-red streak	Green: 3.3 Red: 3.6	800	1.55	0.379	0.39
Cartridge, Signal, Mk-121	9 mm. semi-automatic pistol	Red streak	4.5	1400	1.17	0.394	0.27
Cartridge, Signal, Mk-122	9 mm. semi-automatic pistol	Green streak	4.5	1400	1.17	0.394	0.27
Cartridge, Signal, Mk-123	9 mm. semi-automatic pistol	Yellow streak	4.5	1400	1.17	0.394	0.27

[1] Above launch point

NAVORD OP 2213 (SECOND REVISION)
NAVAIR 11-15-7

above most jungle foliage. These signal displays appear as continuous streaks of colored light from just above the point of firing to burnout. They last for an average of 4 seconds.

You load these cartridges into the clip of a 9 mm. pistol the same way you load ball rounds. You can also load them one at a time directly into the breech of the pistol but an empty clip must be in the pistol for the round to be fired. When firing successive rounds from a clip, you have to recock after each shot because the propellent charge in this device is not powerful enough to force the slide back and eject the case of the spent round. When handling the cartridges, take care to avoid striking the primers accidentally and keep them away from sources of excessive heat at all times. Apply the same safety precautions observed with the Mk-130 series.

So much for what's currently in the Navy inventory. So what's new? Under development at the present time are two aerial day signals – the Mk-113 and the Mk-114. (See Figs. 3 and 4.) The Mk-113 comprises a signal and a

Under development are two new pyrotechnic devices, the Mk-113 and the Mk-114. The Mk-113 is fired from a .38 cal. pistol by means of a plastic adapter as shown in the photo above whereas the Mk-114 is fired from a launcher.

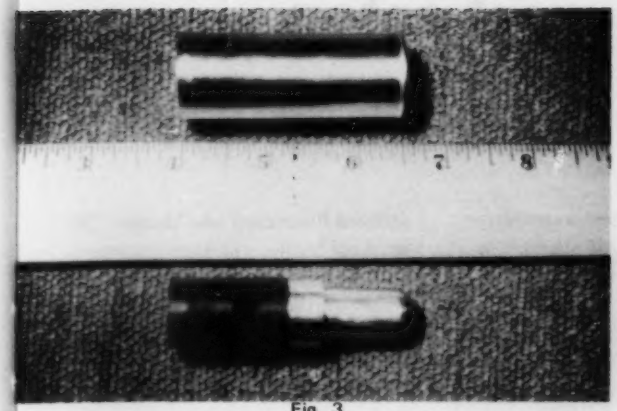


Fig. 3

The Mk-114 cartridge is at the top and the Mk-113 at the bottom.

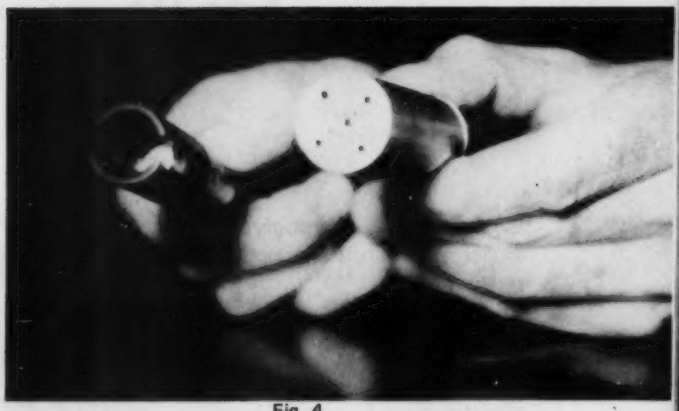


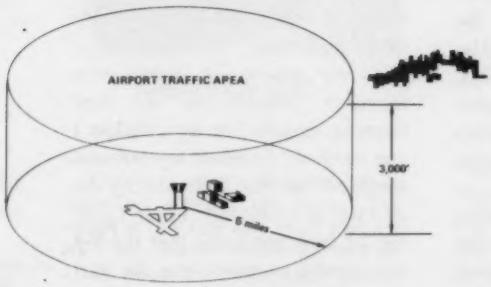
Fig. 4

The Mk-113 cartridge is on the left and the Mk-114 on the right.

plastic adapter which permits the round to be slipped onto the end of a .38 cal. pistol. The red smoke display begins some 100 feet above ground level and continues to about 450 feet. The Mk-113 is "propelled" by the momentum exchange between the bullet and the signal. A second pyrotechnic signal, the Mk-114, produces a smoke trail considerably more dense and visible than that of the Mk-113 and the signal will penetrate a considerably denser jungle canopy. The Mk-114 consists of a rocket assisted signal fired out of a launcher. Its red smoke display will begin about 25 feet above ground level and will extend to at least 500 feet. According to NAD Crane, immediate Navy plans appear to be for the Mk-113 and the Mk-114 to supplement the present Mk-13, Mk-79 and Mk-130 series signals.

(Approach is indebted to Mr. David Haas of NAD Crane for source material for this article and to HMC J. A. Anderson of the Aerospace Physiology Training Unit, Naval Hospital, Whidbey Island, whose Anymouse started the whole thing. – Ed.) ◄

AIRPORT TRAFFIC AREAS



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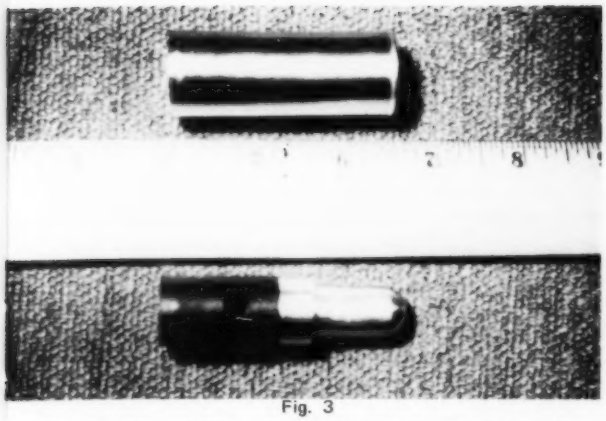

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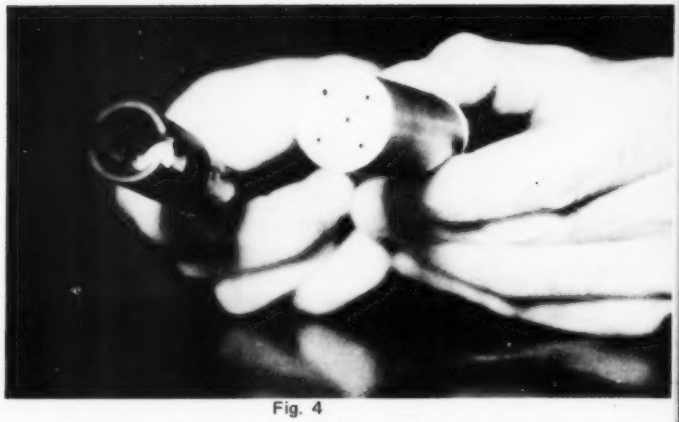

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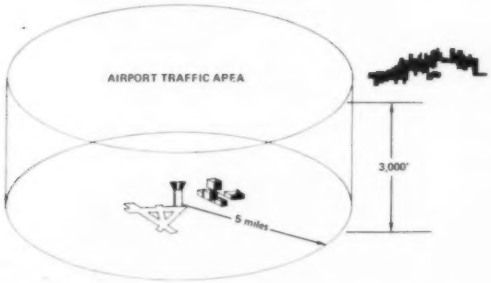

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Hypoglycemia

IN A recent aircraft accident, "voluntary starvation" of 24 hours duration was given as a contributory cause. Although of short duration, such a food fast is a potential hazard since it deprives the body of the fuel necessary to operate the bodily systems at maximum efficiency. All foods have a certain energy content. Such energy is reflected in the blood and easily quantitated in terms of "the amount of glucose."

By a series of regulatory factors similar in operation to a household thermostat, the body's blood glucose level is maintained within a narrow range which varies according to food intake and storage, and energy utilized. Insulin, a hormone, lowers the blood glucose level by diverting glucose into the energy processing pathway. The insulin level fluctuates to and fro, depending on the blood glucose level: a high glucose level requires more insulin and a low glucose level may even "turn this system off."

Storage of readily accessible food energy occurs primarily in the liver and is unpredictable in amount but usually short lived. Once this storage reserve is depleted, the body has to break down its tissues to meet the energy demands. Because this method is an emergency route, it is less efficient and will not supply adequately those activities which require large amounts of energy.

Flying is just such an activity!

When the blood energy level (glucose) is depleted to a subnormal level (hypoglycemia), various symptoms can be experienced, ranging from lack of stamina to a dramatic loss of consciousness manifested by fainting or convulsions. This is appropriately analogous to fuel starvation. Other symptoms include irritability, headache, tremulousness, sweating, nausea, impaired judgment, shortened attention span and psychiatric maladies which are all reversible and preventable by "eating food."

Therefore, for a happy flight there should be adequate fuel in *both* the aviator and his aircraft.

LCDR Paul E. Petit, MC, USN

Payoff

THE flight deck lifevest worn by an AMS3 made life easier for him when he was blown off the flight deck by jet blast.

"I was waiting for airstart on a squadron aircraft on the first morning launch," he says, "when I was suddenly lifted off my feet and swept off the No. 2 elevator by the jet blast of a *Crusader*. I didn't hear the air boss announce that the F-8 was turning to move from the port catapult to the starboard."

The petty officer, his feet knocked out from under him, "slid and floated" over the flight deck, under the droptank of an adjacent aircraft and then into and out of the life net. During the fraction of a second when he was in the net, he grabbed what felt like a pipe but his forward momentum flipped him over it and he lost his grip. He fell some 65 feet to the water. Landing on his back, he surfaced and inflated his lifevest. As he says, "It worked!"

Although the sea was calm, the wake of the carrier bounced him around enough to cause him to lose sight of the ship every now and then. At first he thought no one had seen him go over the side. There were no flares from the ship and the plane guard helo seemed to be in its usual position. He began to swim slowly to position himself nearer the approaching plane guard destroyer when, looking up again, he saw the helo heading his way.

"It was only a short time after getting up into the helo that I was back on the flight deck," he recalls. "It seemed to me that it was no more than three minutes from the time I was blown over the side until I was in the angel."

It pays to wear survival equipment!

Slides Head First

MAKE safety part of summer fun – especially when swimming and diving.

An example of what can happen when you don't is an unnecessary, tragic swimming pool accident which took place last August. While swimming with some buddies, an enlisted man slid down the pool slide head first. He struck the bottom of the pool and became semi-conscious. He was immediately pulled out of the water. His injuries – fractures of two cervical vertebrae – were serious. After four-and-a-half months in the hospital he was released on indefinite leave status,

notes from your flight surgeon

reevaluated and placed on the temporary disability retired list.

Several Navy men have had similar accidents, some of them resulting in complete paralysis of the arms and legs. The most frequent injury cause is diving into shallow water.

When you are swimming and diving, *don't take chances*. One careless, thoughtless act and the good life can be gone forever.

Slippery Gloves To Go

SLIPPERY nomex flight gloves finally seem to be on their way out.

NAVAIRDEVCEN (Naval Air Development Center) advises that from now on any new procurement of gloves will require a silicone coating during manufacture which will eliminate the problem of slipperiness when the gloves are wet.

Replacement of the gloves now in the supply system will be on an attrition basis. At present, glove stocks are adequate and no new glove contract has been let.

The Subject Is Sunlight

THIS seems like a good time of year for some reminders on the subject of sunlight.

If you're going to be out in the bright sun – on the flight line, at a swimming pool, at the beach, on the golf course or even in your own backyard – wear your sunglasses, *particularly if you are on the schedule for night flying*. And even if you're not going flying at night, remember that you need your dark adaptation for night driving *so wear those sunglasses*.

Intense sunlight can have a cumulative and adverse effect on your night vision. Lying on a white beach in bright sunlight without sunglasses can significantly reduce your ability to dark-adapt for as long as 36 hours, according to the *Navy Flight Surgeon's Manual*. Even short exposures can have bad effects on your night vision. McFarland, in his classic *Human Factors in Air Transportation*, cites a series of carefully controlled observations in which individuals exposed to intense sunlight near the sea for only two to five hours showed definite impairment in their sensitivity to light. Dark-adaptation thresholds rose, indicating a loss of 30 to 50 percent in visual function as compared to normal. (The same effect can result from flying above white clouds with bright sun on them or flying over snow.) In addition, McFarland points out, a "glare conjunctivitis" is not infrequent in the tropics and headaches and visual fatigue are also common complaints.

Now for a word about sunburn. A bad sunburn or a mahogany tan acquired too quickly can cause irreparable damage to your skin. Some medical authorities are of the opinion that a deep suntan can lead to skin cancer. Certainly most doctors will tell you that a deep suntan toughens, dries and ages the skin. Remember that a suntan should be developed in easy stages and that reflected sunlight can tan and burn you even on a cloudy day.

A final reminder – no type of engine oil, whether it's motor or lubricant, should be used for suntan lotion. These oils frequently contain highly toxic materials which can readily be absorbed through your skin. ◄

Beware the Rat!

RECORD yet another save for Navy issue steel-toed boots!

The photo above is vivid proof of the protection afforded the wearer. The culprit in this case was, of all things, a Ram Air Turbine rotated by 50-knot winds across the flight deck. One of VA-85's more aggressive plane captains was attempting to install a jury strut in the port wing of an A-6 when the RAT made contact with his foot. The contest was considered to be a draw. "Beware the bite of the RAT!"

LT Robert A. Fuicelli
VA-85 ASO

In a Real Bind

or "The Big Squeeze Play"

illus 34-35

AN advance training flight instructor and student departed home base in a TF-9J on an extended cross-country flight to a Northeast AFB. The several legs of the flight to destination were routine except for a problem in closing the canopy prior to takeoff at the first enroute stop. That is, the student in the front cockpit was unable to close the canopy but the instructor was able to do so by operating the rear seat control.

After an RON at the AFB, the instructor and student prepared to depart. Preflight, start and taxi appeared to be normal. An IFR clearance was received and takeoff clearance was granted. At this point, while still short of the active runway, the student was unable to close the canopy. Once again, the instructor operated the canopy control lever from the rear seat. This time, however, the canopy remained in the fully open position. He declutched the system and manually closed the canopy, then reclutched it. He then opened the canopy partially and tried to reclose it using the regular canopy control handle, but without success.

After several attempts to reclose the canopy, the instructor advised the student that he was going to correct the discrepancy and proceeded to unstrap. His intent was to inspect the left-hand access door No. 23 (dog house door). *He left the canopy clutched and the control lever in the closed position.* Before exiting the cockpit, however, he noticed the canopy close limit switch (see photo) located behind the rear ejection seat. Realizing this switch might be the cause of the problem, he decided to investigate.

To reach the switch, he had to face the rear of the aircraft in a standing position with one foot on the ejection seat or instrument side console and the other foot on the cockpit deck. He was in this position as he reached for the switch and moved the rocker, freeing the stuck actuator. This allowed the hydraulic system to close the canopy (canopy control handle was in the closed position), trapping him between the rear seat windscreen and the closing canopy.

The forward canopy bow struck him just above the left elbow driving his right side against the windscreen, breaking several ribs. In vain, he tried to attract the student's attention. Fearing that he would be crushed to death, the instructor decided upon a desperate measure to focus attention on his predicament; *he deliberately pulled the ejection seat face curtain and fired the ejection seat*! He also hoped that the breaking of the canopy plexiglass would provide some relief from the crushing force. The departing seat broke the instructor's leg and also caused pelvic injuries.

The student failed to hear the instructor's frantic calls and did not hear the seat fire but the flying plexiglass drew his attention to the situation in the rear cockpit. The student was unable to tell immediately the exact nature of the problem but heard the instructor yelling, "Shut it off." Without hesitation, the student shut down the engine, unstrapped, turned around and then recognized that the instructor was pinned by the canopy.

The student immediately sat back down and attempted to place the canopy control lever in the emergency-open position but apparently did not use sufficient force and the emergency system remained unactivated. (The student later stated that the handle felt stiff and was binding, but post-accident tests showed that the system could be actuated with proper force.) Due to engine rundown, hydraulic pressure was no longer available to open the canopy in the normal manner.

About this time, a roving crash vehicle arrived on the scene and the pilots directed crewmen to activate the external emergency pneumatic canopy handle which opened the canopy and freed the instructor. Shortly thereafter, an ambulance arrived and the injured pilot was evacuated for medical treatment.

It is apparent that this accident would not have occurred if the canopy limit switch had not malfunctioned. However, it is also apparent that the instructor failed to take proper precautions prior to troubleshooting the system. Failing to take the precaution of placing the canopy handle in the open

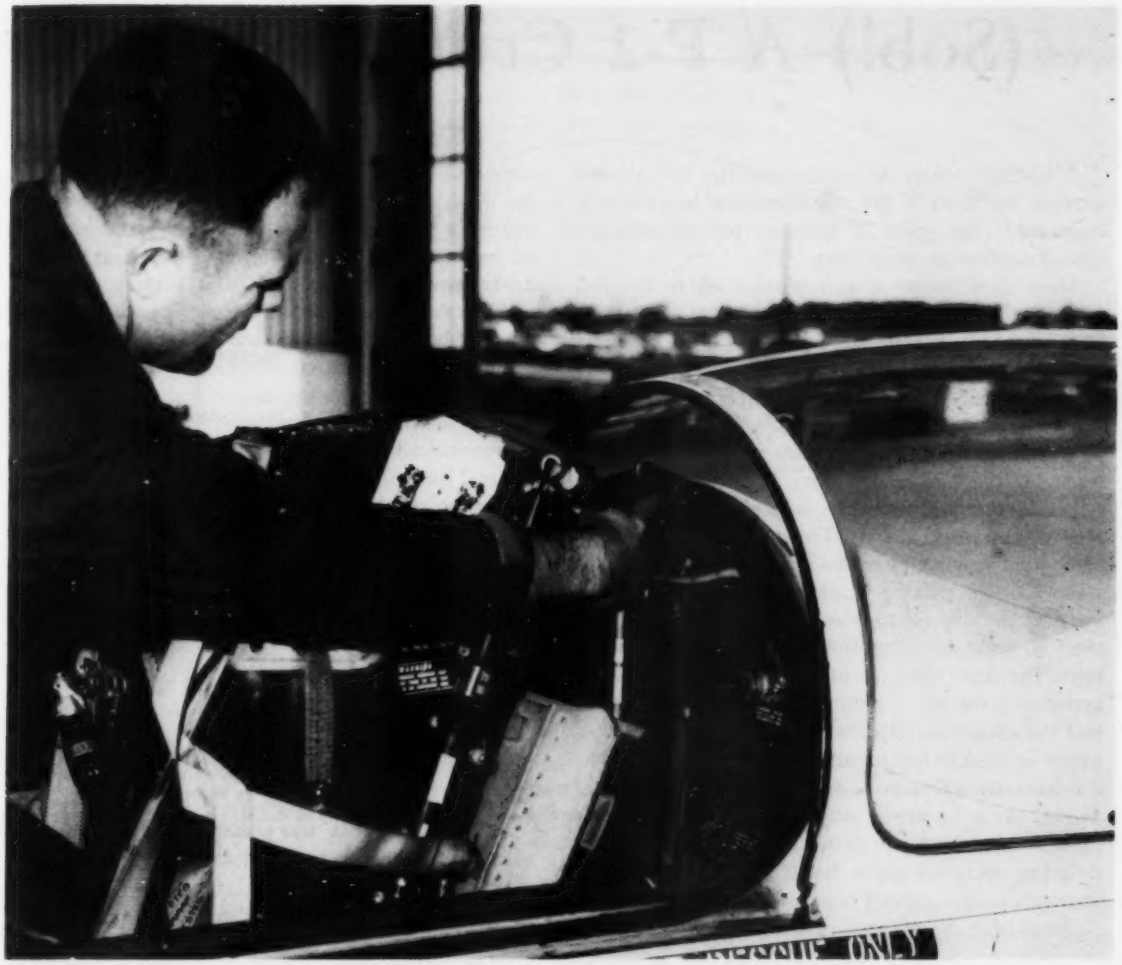


Photo shows a demonstration manipulation of the canopy close limit switch.

position and/or declutching the system, the instructor then stood up in front of what amounted to a loaded gun. He then effectively "pulled the trigger" by manipulating the limit switch.

A check of previous yellow sheets revealed a history of minor canopy gripes including several in which the canopy close limit switch had apparently jammed. This problem is a common one in the TF-9J and is associated with the south Texas environment which causes a corrosive buildup on the actuating plunger.

The accident board recommended:

- A continuous program of monthly inspections and lubrication of the canopy close limit switch to prevent a cumulative buildup of corrosive deposits which might cause a malfunction.
- A comprehensive program of reeducation for all TF-9J pilots in normal and emergency operation of the canopy system, including troubleshooting precautions.

In retrospect, one salient point stands out in this accident report, i.e., it occurred away from home base. Had the canopy malfunction occurred at home, it is more than likely that the pilots would have returned the aircraft to the line for troubleshooting by qualified maintenance personnel. This points out the fact that while operating away from home field there are always added demands placed upon pilots. It may be nothing more than taking extra precautions to see that the aircraft is properly serviced *but* it can easily lead to shortcuts and continued operation of an aircraft having substantial discrepancies.

Finally, whether it is a pilot or a maintenance man involved, all hands must possess both the knowledge and discretion to be able to visualize the consequences of their actions when operating any power control. ◄

(Sob!) A P-2 Crunch (Sob!)

"SKIPPER, there is no excuse for the ground accident but if you'd like an explanation, here's how it happened." The quote is fictitious but as with any ground accident there is a story.

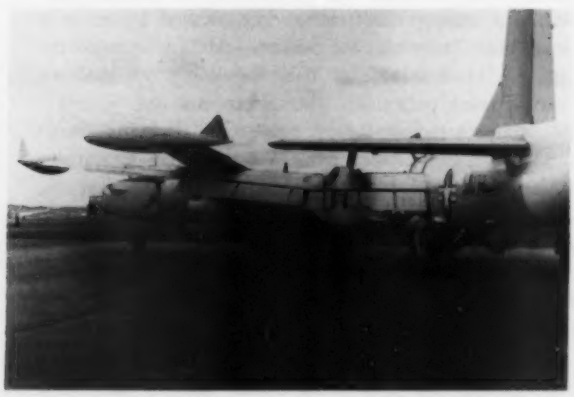
Many months ago a mishap occurred to two P-2 aircraft which could be repeated at many air stations with this type aircraft or any other type if similar conditions prevail. A JCN (job control number) was issued to defuel No. 1 P-2 for a port wing heater fuel pump leak. Fuel farm and fire department personnel were notified to provide a defueler and crash truck for the ensuing operation. The location for this rather routine job was to be on a closed runway well clear of any other aircraft. The defueler and the crash truck were standing by as the aircraft was towed to the area. The P-2 parking brakes were set, chocks were inserted, the tow tractor was disconnected and all were ready to begin defueling. However, before the defueling began fire department personnel realized there was no provision at the area to ground the aircraft and suggested that the aircraft be relocated. Another spot was selected which satisfied all requirements except that it meant No. 2 P-2 would have to trade places with No. 1; i.e., No. 2 would have to be towed away and parked on the closed runway while No. 1 could be positioned for the defueling operation where No. 2 was parked. Figure 1 shows the airport parking ramp layout.

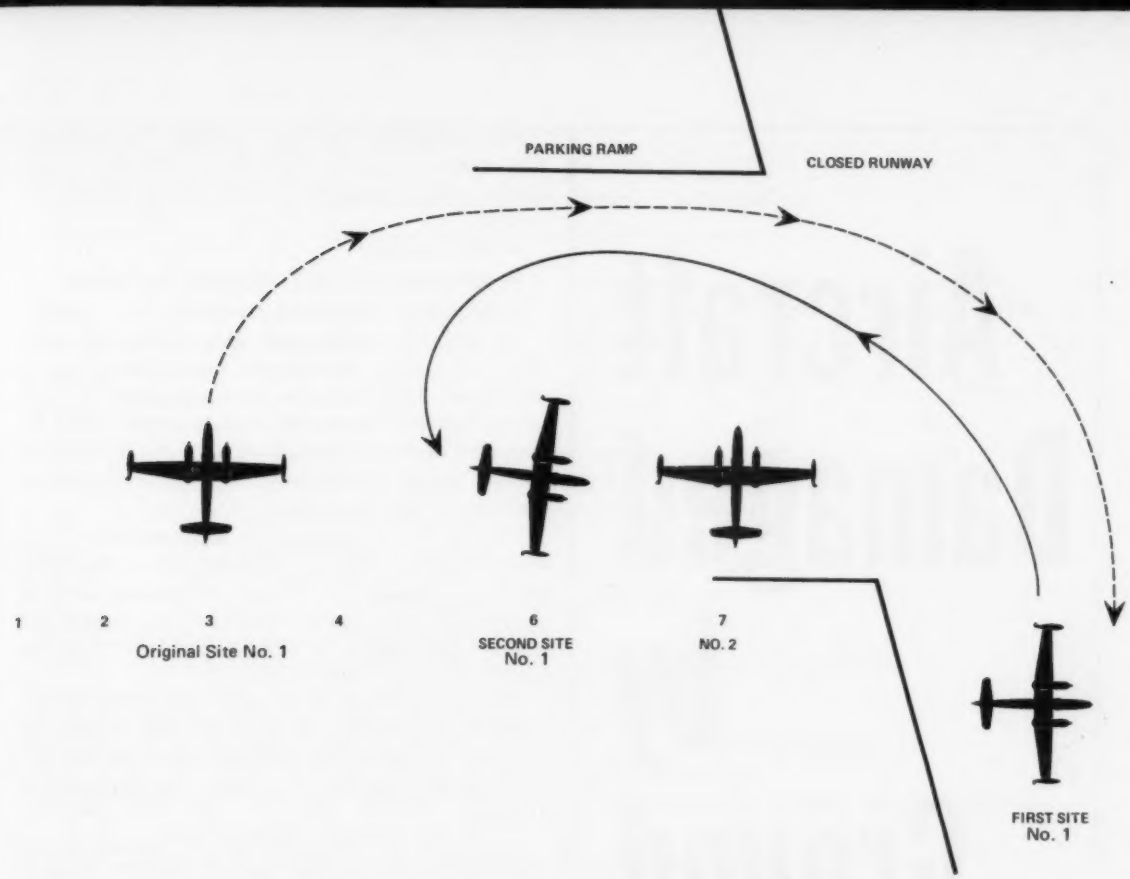
Respotting began and as shown No. 1 P-2 was temporarily parked 90 degrees to No. 2 P-2. Before No. 2 could be moved, No. 1 which was parked on a slight decline, began to roll forward after the tow tractor had been disconnected, jumped the *one chock* (splitting it), continued to roll over another chock which was twice reinserted by the wingwalker and finally collided with No. 2 as shown in the photographs. Before the tractor had been disconnected the emergency brake had been set and the brake rider confirmed this to the tractor driver (supervisor). When the aircraft began to move, the brake rider rechecked the position of the brake handle, pulled it back as far as it would go and then jumped on the binders – all with no effect. He left the cockpit at the last second before the crunch and was not injured.

Most readers will undoubtedly form the opinion that this ground accident was pure and simply *"one of those things."* Not so! The investigation brought to light many interesting points; such that even with the reasonable care taken by the ground handling crew there was a lot more that should have been done.

- There were only three men assigned to move the P-2 – the tow tractor driver, the brake rider and a wingwalker.
- Not all of the ground handling crew were trained and qualified in P-2 ground operations.
- Battery voltage was insufficient to supply adequate electrical power to operate the emergency hydraulic pump.
- Only one chock was placed in front of one main mount before the tractor was disconnected.
- There were insufficient chocks on the parking ramp and those that were available were the wrong size and poor quality to be effective for P-2 aircraft.

Many times in various articles in APPROACH, MECH and CROSSFEED, when discussing ground accidents, points have been raised that will enable ground crewmen to avoid these costly mishaps. Some of these points will

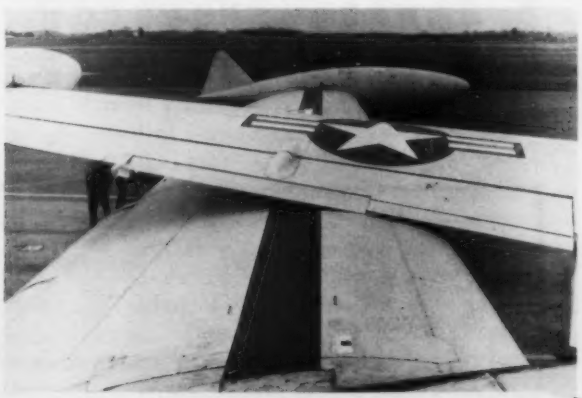




(The dash lines show where No. 1 was first moved from spot 3 to the closed runway. The solid line shows where No. 1 was then moved to vacant spot 6, intending to move No. 2 P-2 out and defuel No. 1 in spot 7.)

Fig. 1

be reiterated so that hopefully they will help prevent such waste. It is important to assign the right number of qualified personnel to do the job. Supervisors must be in position to do just that – to oversee the evolution and not become a part of it. Brake riders must know the aircraft systems so that when brakes are needed they will know how to use them. Wingwalkers and chockmen must know their jobs as well. The former must be particularly alert to proper clearances and the latter must have the right kind of chocks for the aircraft being moved. There have been many occasions when a chock judiciously applied could have saved an aircraft from going over the side or could have stopped a rolling aircraft on the ramp.



Aircraft Damaged by Ground Support Equipment.

take 38-41

STAGGERING, sobering, wasteful, unbelievable! You name it. It's enough to give anyone second thoughts. Here's the picture, over a six-year period, in a nutshell.

- 2129 mishaps.
- 319 casualties (33 fatal, 94 major, 192 minor).
- $77,493,220 damage to aircraft.

At least one mishap took place at virtually every naval air station and aboard nearly every carrier, amphibious assault ship or other operating locations scattered around the world, including such exotic far away places as Buenos Aires, Hong Kong, Frankfort, Java, London, Taiwan and Thailand. Over 100 naval ships and activities had multiple mishaps.

The statistics were compiled, after a study of data gathered from 1 January 1965 through 31 December 1970, of damage to aircraft by ground support equipment – not battle damage; not operational damage; just damage to aircraft by pieces of ground support equipment. CRUNCHES!!!

The primary cause of virtually 100 percent of the crunches was personnel error. A tabulation is shown in Fig. 1 of the breakdown by individuals responsible for the crunches during one year, 1965. It is representative of all years.

Frequently more than one individual was adjudged at fault for the crunch so that those responsible for damage are greater than the number of crunches. For example: the wing flap struck an oil bowser. The pilot was performing a cockpit check after turnup. The plane captain gave a signal to lower flaps and extend speed brakes. When the starboard inboard flap lowered it struck the oil bowser parked under the flap. The aircraft was being oiled by personnel on the wing. The *plane captain* failed to ensure personnel and equipment were clear of the aircraft for the check. *Servicing personnel* had improperly positioned the oil bowser. The *supervisor*, who was conducting OJT for the servicing personnel, had been distracted and did not witness the crunch. The mishap just described was unusual in that so many persons were on hand. By far the majority of mishaps were caused by one person, with lack of supervision frequently assigned as a contributing cause. Nearly every time the damage was caused by a single

Personnel Error

	Operators	Supervisors	Directors	Plane Captains	Others	Total
Number	165	85	31	14	34	329
Percent	50	26	10	4	10	100

Fig. 1

Flight Operations, Crunches & Class Rates

(All Statistics Covering 1965-1970 Time Span)

Class	*Flight Operations Per Station	No. Stations This Class	Total Class Flight Ops	Total Crunches	Class Rate/ 100,000 Flt Ops
A	More than 1,500,000	5	8,385,905	131	1.56
B	1,000,000 – 1,500,000	8	9,653,970	313	3.24
C	800,000 – 1,500,000	5	4,619,069	215	4.65
D	700,000 – 800,000	6	4,459,674	211	4.73
E	500,000 – 700,000	7	4,390,993	165	3.76
F	400,000 – 500,000	5	2,298,351	158	6.87
G	300,000 – 400,000	11	3,992,119	171	4.28
H	200,000 – 300,000	6	1,493,487	105	7.03
I	Less than 200,000	14	1,414,381	130	9.19

*A flight operation is a landing or takeoff

Class A – Meridian, Lemoore, Whiting, Ellyson, Miramar
Class B – Corpus Christi, Kingsville, Chase, Saufley, Yuma, Cecil, Pensacola, Patuxent River
Class C – Cherry Point, Lakehurst, Imperial Beach, North Island, Oceana
Class D – Cubi Point, Alameda, El Centro, Key West, Monterey, Norfolk
Class E – Moffett, Whidbey Island, Dallas, New Orleans, Beaufort, Los Alamitos, Barbers Point
Class F – Quonset Point, New River, Roosevelt Roads, Atlanta, Jacksonville
Class G – Memphis, Glenview, Keflavik, South Weymouth, Point Mugu, Fallon, Quantico, Glynco, Kaneohe, Albany, Iwakuni
Class H – Willow Grove, Sangley Point, Atsugi, Agana, Rota, Guantanamo
Class I – Brunswick, Kodiak, China Lake, Sigonella, Washington, Warminster, Detroit, Naples, Lages, Naha, Futema, Argentia, Midway, Adak

(Note: A few air stations, El Toro and Santa Ana – still active – and Olathe, Twin Cities, Seattle, New York – now closed, are not included. Two stations, Grosse Ile and Sanford, were included in Detroit and Albany statistics.)

Fig. 2

individual, the words *inexperienced, unqualified, careless, inattentive, operating defective equipment, unauthorized* and *unlicensed* appear time and time again. These words were not assigned by the Naval Safety Center. They were used by the CO or ASO of the activity where the crunch occurred.

Where in the Navy . . .

In order to compare the number of crunches on the basis of exposure and to establish a crunch rate for naval air stations it was decided to use flight operations at each air station as the yardstick. Flight operations were compiled for the six-year period or were projected if they were incomplete for the entire six years. Those crunches which occurred aboard ship or at activities other than Navy are not shown. As illustrated in Fig. 2 naval air stations have been divided into classes by frequency of flight operations and surprisingly the crunch rate *increases* as the tempo of flight operations *decreases.* It is important to remember that at those locations where there are many activities homeported, the host is not responsible for the crunches of the tenants; in many cases the host is oblivious to these mishaps. However, most hosts bear the responsibility for GSE operator and maintenance training, mechanical condition of the gear when issued, repair and refurbishing when turned in by the tenant and therefore play a very important part in the scheme of GSE things.

From the statistics available there is not a clear relation between the volume of flight operations and GSE-damaged aircraft within a class but there is no known tabulation of the number of aircraft ground movements which might provide a better basis for comparison. Therefore, the number of GSE mishaps and

Casualties

Year	Fatal	Major	Minor
1965	-	7	7
1966	2	4	5
1967	1	4	2
1968	-	6	5
1969	30	68	272
1970	-	5	1

Fig. 3

the crunch rate at any activity would be influenced by base loading, construction programs, presence of a NARF, the type of GSE programs in effect, driver licensing, training programs and other related factors.

Casualties

The casualties shown for the study period (see Fig. 3) are highly inflated as the result of fire aboard USS ENTERPRISE (1969) but the fact that GSE (a huffer) set off the holocaust emphasizes the importance of the care, caution and observance of good safety practices, at all times, when using GSE. Two other fatalities occurred the same year of the USS ENTERPRISE fire – one involved a plane captain who was lost when his aircraft rolled overboard while being positioned on No. 1 elevator and the other occurred when a crewman was knocked off a piece of mobile equipment and killed. Personnel using unauthorized pieces of yellow equipment as workstands has been a common cause of many casualties reported. Another common cause was the hidden crewman (in a wheelwell or out of sight of the plane director) being injured when the aircraft was moved. Other causes of injuries involved loss of control of tractors by drivers. In one instance a tractor driver, while following another vehicle on the ramp, lost control and collided with the sponson assembly of a helicopter, collapsing the sponson and causing the helicopter to roll over and pin the driver in his seat. Finally, there were many injuries to crewmen who fell off workstands, boarding ladders and just about anything which permitted work above the deck, whether it was designed for the purpose or not.

$$$

If the great number of mishaps which occurred during this period and the number of casualties isn't enough to get all hands excited, perhaps the dollar damage to aircraft is. *It amounts to an astronomical figure of 77.5 million dollars.*

Aircraft Models

Almost without exception every model aircraft in the naval inventory has been damaged by ground support equipment. The heaviest tolls were inflicted on cargo/transport models followed by attack, fighters, helicopters and trainers. Although not damage free by any means, other models such as antisubmarine, patrol, carrier early warning and utility/observation took a lesser beating. In this context the numbers of any model damaged can be expected to be higher in those models which are more numerous, except for cargo/transport models which do not fit the pattern at all. It is possible that since cargo/transport models are bigger and take up more room *and* are in and out of air stations which normally do not support them, unfamiliarity may be the main reason they are more susceptible to GSE damage than other models.

What Can Be Done?

The ideas and suggestions which follow are not new. They do not cost the activity any money. Some have been tried at various activities and proved successful. Initially it is suggested that there be established an activity ground support equipment program. (Some excellent ideas were discussed in the article, Ground Support Equipment at NAS Whidbey Island by ASC Orville H. Learned in the Winter '69 issue of MECH.) Perhaps an acronym, ARMPITS, would be helpful and it is certainly suggestive of the depth necessary to reduce crunches. **A**—*Attitude* tops the list. If a positive attitude on the part of every GSE operator and maintainer is developed, and sustained, the program is off to a good start. The attitude recommended being that individuals perform work only if qualified. Can-do spirit is great but it must be combined with qualification. Establish **R** — *Ramp patrol* to ensure only qualified operators are driving mobile equipment correctly and safely and that users of other ground support equipment are authorized and

qualified to use them. **M**—*Maintenance* and care of GSE is all important. There are far too many instances of aircraft damaged by "helpful" unqualified persons. Proper maintenance, whether it is merely checking oil, water, tires and gas or turning a wrench demands someone who is checked out and knows what he's doing. Positive control of all GSE in custody of the activity to ensure good operating condition greatly reduces the chance of a crunch. **P**—*Pride* in operating the equipment according to the handbook and activity regulations, and only that way, is indicative of real can-do. **I**—*Interest* in doing the job right the first time with the right GSE, right tools and the right number of people means success. **T**—*Training* of personnel on a continuing basis is money in the bank. Ensuring that personnel are qualified to operate and maintain GSE is a good way to reduce crunches. An individual who has a ticket to operate a piece of mobile equipment should be required to demonstrate that he can operate it correctly. **S**—*Supervision* is another key to effect and sustain an excellent GSE program. Supervisors who assign only qualified directors, drivers, wingwalkers, chockmen and operators can, within reason, expect the GSE to be used correctly, efficiently and safely. Supervisors who assign only qualified maintenance personnel to issue, repair and calibrate the equipment can be sure the equipment will perform satisfactorily. Supervisors who oversee shop and line operations and are on hand to coordinate and control the use of GSE can ensure that proper safety and activity regulations are executed. These programs, suggestions and recommendations are not the only ways, by any means, to reduce the damages to aircraft and injuries to ground personnel but they will go a long way toward greatly decreasing the crunch rate. The establishment and execution of a carefully conceived ground support equipment program will get rid of the "UNs" and "INs" – unlicensed, unqualified, unauthorized, inexperienced, inattentive users and abusers of ground support equipment. Eliminating these traits will promise a large reduction of crunches. To sum it all up in one word, the key to the problem is *professionalism*. ◄

Our Command Responsibility

YES, safety is a command responsibility and I'm sure commanding officers gladly accept this responsibility. It does not, however, stop there! Safety is everyone's endeavor from the top to the bottom of the chain of command, to the flanks and back again; safety is attitude; the command's attitude toward cheerful and willing obedience to orders in the execution and accomplishment of the squadron mission. Safety is to be considered in *every* decision. Bear in mind the word itself and the meaning each letter conveys:

*S*eriousness . . . in accepting the personal responsibility to learn, remember and excel in performance, both in the air and on the ground.

*A*bility . . . to execute flight maneuvers and emergency procedures professionally through repetitious practice the NATOPS way . . . the correct way.

*F*oresight . . . in knowing your limitations and those of the aircraft and never exceeding either, but achieving successfully the maximum of both.

*E*ffectiveness . . . the level of training attained through the teaching-learning process, teaching by example and motivating in all a desire to know and execute safe operating procedures.

*T*emper . . . self-control and utilizing it to the best advantage in all situations.

*Y*ou . . . the most important element of any safety program, your *attitude* that safety is paramount, your *confidence* and personal knowledge of the aircraft systems at the voluntary recall level, the emergency procedures at the habit level of learning and your *pride* in accomplishing flight tasks safely, smoothly and quickly.

It's not my program or your program . . . it's *our* program. Together we can make it work, together we will make it work.

LTCOL R. G. Courtney
MAG-56 Safety NATOPS

DON'T BEND THE ELBOW

illus
42-43

DON'T PANIC!! This article is not concerned with the elimination of "Happy Hour." It does, however, have to do with the prohibition of a certain type of elbow bending. Namely, the elbow section of the bleed air duct assembly which attaches to the engine installed in F-8H aircraft. Take the time to read the report of the aircraft mishap which is presented below and you'll see what we mean.

42

Lieutenant Blank was scheduled as the leader of a four section F-8H flight on a practice air-to-air gunnery mission. The preflight evolution went as smooth as clockwork, as did takeoff, rendezvous and transit to the gunnery area.

After entering the pattern, LT Blank noticed that the air conditioning system was not producing an adequate supply of cool air. About five minutes later the generator failed and he switched to RAT power. The radios came back on the line and all instruments read normal. LT Blank then detached one aircraft in his flight to escort the banner back while the remainder of the flight conducted time checks. Shortly after switching the flight to tactical frequency he noted that the engine-driven fuel pump light was on. About two minutes later the oil hydraulic pressure warning light came on and oil pressure dropped rapidly through 25 psi, went to zero, rose to 20 psi and then started slowly down. LT Blank immediately contacted the tower and declared an emergency, followed by a successful approach and landing.

The postflight inspection revealed that the 16th stage bleed air duct had ruptured, causing extensive damage to electrical components in the engine cavity section of the aircraft. Maintenance personnel then inspected the main generator and engine-driven fuel pump and found that

Photo 1 shows the damaged bleed air duct.

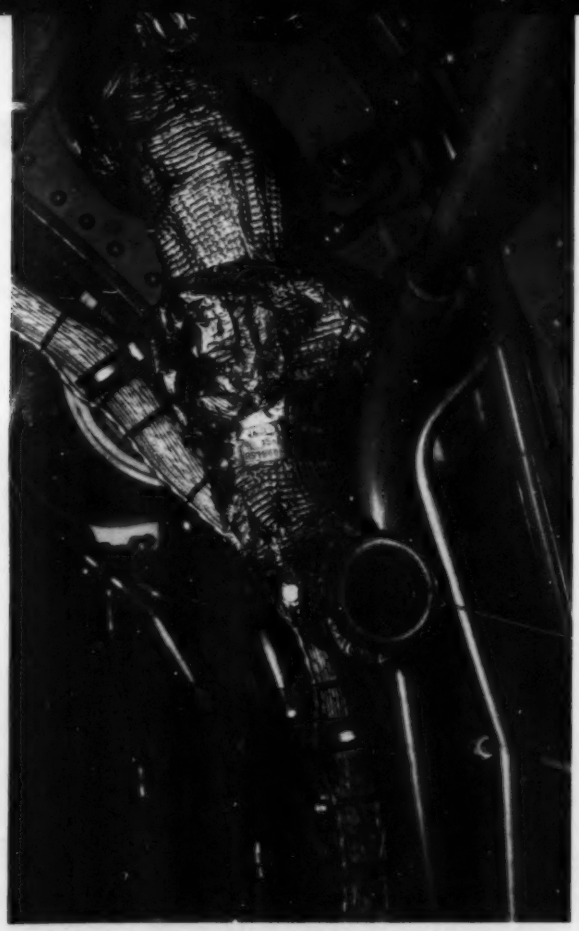


Photo 2 shows squadron aircraft undergoing maintenance with elbow still installed and safety wired to enable engine removal.

Fig. 1 illustrates direction elbow was pulled to facilitate engine removal and direction of torsional bending.

they were operating normally. It was determined that the cockpit warning indications were triggered by heat damage to electrical wiring rather than a series of individual failures. The accident investigation was then directed towards determining the cause or causes for the duct failure.

The bleed air duct was examined and it was found deformed as a result of torsional bending near the area of the failure (see Photo 1). Further investigation revealed that this torsional bending was caused by improper maintenance procedures. The elbow is connected to the bottom of the duct by a coupling and when installed is positioned so as to impede engine removal. It is possible, however, to pull the elbow outboard toward the airframe and achieve clearance to remove the engine without disconnecting the elbow (see Photo 2). When this is done a stress concentration in the form of torsional bending is induced on the duct (P/N 2602302) at the same point where the duct damaged in this mishap is bent (see Fig. 1). This stress concentration is located where the varying air pressures and temperatures in the duct generate cyclic, plastic strain. These two factors, stress concentration and cyclic plastic strain, fulfill the necessary requirements for a fatigue failure.

To prevent the damage described above, the MIM (Maintenance Inspection Manual) requires the removal of the elbow prior to engine pull. After interviewing maintenance personnel and inspecting aircraft undergoing maintenance, it was discovered that the elbow was not being removed. This was in spite of the fact that the area is readily accessible for inspection by shop supervisors and quality assurance personnel. Furthermore, both of these groups were aware that an improper practice was being used, yet did not enforce proper procedures.

The primary cause factor for this mishap was maintenance personnel (attitude?). Supervisory maintenance and quality assurance personnel were listed as contributing cause factors.

The squadron involved in this mishap, through its AAB, is to be commended for the forthrightness of their aircraft accident report. By factually reporting the causes leading to this mishap, it was brought to light that the practice of leaving the bleed air duct elbow attached to the engine during removal was prevalent throughout the F-8 community. As a result all F-8 aircraft were inspected and many were found to have cracks in the same area of the bleed air duct as the one which ruptured in this mishap. This is a classic example of what aviation safety is all about. Prevention of accidents certainly is the primary goal, but learning from one accident or near-miss can lead to the prevention of others with timely and accurate reports. ◄

WELL DONE!

THE Naval Safety Center is always proud to laud members of the naval service for performing acts which lead to the prevention of an injury or fatality and saved or minimized the loss of Navy material. In describing the feat which is detailed below we are doubly proud for it involves *two* Navymen.

At approximately 1600 on 28 April 1970, AMH2 D. C. Barnett and ADR3 M. J. Younghusband, both of Carrier Airborne Early Warning Squadron ONE ONE ONE, Detachment FOURTEEN, were greasing an E-1B on the Cubi Point carrier line. Suddenly an explosion rocked the air and they looked up to see a nearby A-4C burst into flames. Both men immediately dropped what they were doing and ran to the burning plane, picking up fire extinguishers on the way (see Fig. 1). They yelled to a man running away from the vicinity of the fire and told him to call the fire

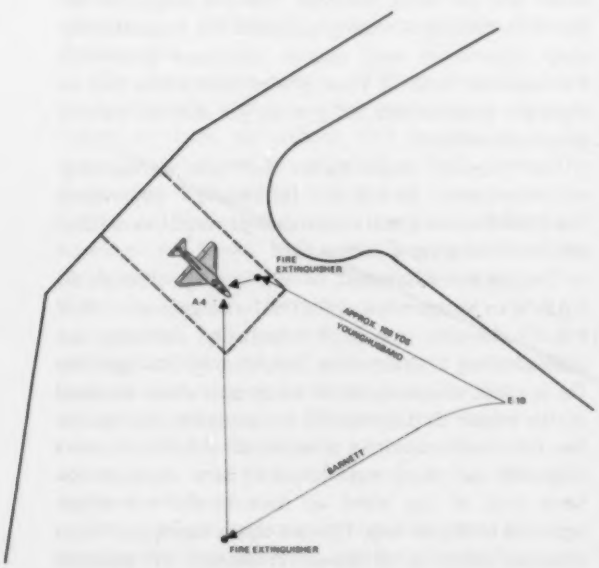


Fig. 1

AMH2 D.C. Barnett, USN and ADR3 M.J. Younghusband, USN

department. Another man who was also leaving the fire area was requested to contact security. As Younghusband moved in to spray down that area of the A-4 most heavily engulfed in flames, Barnett covered his advance by spraying him with his fire extinguisher, while at the same time helping to contain the fire. Even though the danger of a violent explosion was possible at any moment, these men displayed great courage and self-control by continuing to fight the fire by themselves until the foam trucks arrived. By that time the fire was well contained and soon was brought under control, after which the men returned to their jobs.

It is interesting to note that later that same day these two men, along with an unidentified third man, rescued a man who had fallen off the pier into the bay and became entangled in some lines.

For their action in fighting the A-4 fire, Petty Officers Barnett and Younghusband were subsequently awarded the Navy Commendation Medal on 12 March 1971 for heroic achievement. (See accompanying photo.)

The quick level-headed reaction of these two men in responding to this extremely hazardous situation undoubtedly contributed to the expeditious control of what could have been a catastrophic fire. The courage they displayed and their effective use of firefighting techniques has set an example for all, proving once again that "Safety is no accident." To Petty Officers Barnett and Younghusband, a hearty "WELL DONE." ◄

AMH2 Barnett and ADR3 Younghusband receiving the Navy Commendation Medal.

LETTERS

People who boast of having an open mind usually have a mouth to match.
Ace L.

The Constellation Hercules.

"Medical Letters"

FPO, San Francisco – Enclosed are a number of "Medical Letters" dealing with medical problems of general interest to Navy personnel. These articles were written by HM1 Richard A. Hargrave, USN, and LT David H. Gundy, MC, USNR. The "Medical Letters" were first published by HM1 Hargrave during a squadron deployment to Naval Station, Sangley Point, Republic of the Phillipines, with a permanent detachment at NAF Cam Ranh Bay, Vietnam. With split squadron operations and heavy operational and training commitments, it was not feasible to schedule medical lectures for all squadron personnel. The "Medical Letter" was the solution to this problem and was well received by all hands. The letters were again published under LT Gundy's supervision during the squadron's most recent deployment to NAF Naha, Okinawa.

Perhaps some of these items might be published to provide an example of a means of reaching all personnel under similar operational conditions.

CDR J. G. Gahafer
CO, VP-47

• Your "Medical Letters" show what can be done with factual material and some imagination. For a starter, please see box at right:

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Coffee, Tea Or Milk
But Not Much Sympathy

An Open Letter To Motorcyclists
From A Hospital Corpsman

CAN you imagine yourself riding in a car doing 30 to 35 miles per hour (or faster) and then falling out onto the pavement? Of course you would not do this purposely, but in effect, that is just what you *are* doing when you spill off of a motorcycle.

Motorcycle accidents take their toll – officers and enlisted alike. The abrasion, scrape, strawberry or whatever you want to call it is the same as a second or third degree burn. It takes a long time for the skin to regenerate and the injured area to become inoffensive looking. Abrasions are not the only injuries which result from motorcycle accidents. Fractures are commonplace. And then there are fatalities.

At one naval hospital where I was stationed there was a separate ward for motorcycle accident cases. It was full continuously! Imagine how many man-hours are lost throughout the entire Navy from motorcycle accidents alone.

I am not advocating that everyone give up motorcycling. It is a good sport and has certain advantages. For instance, you can operate a cycle more economically than you can an automobile. However, as a cyclist you are lacking the protection which an automobile offers you.

A particular danger to the motorcyclist (and, of course, to the automobile driver also) is alcohol. As you know, your reaction time slows in relation to the amount of alcohol ingested. Quick reflexes and good judgment are a necessity in the *normal* operation of a motorcycle. You can imagine how dangerous it is to drive or ride while drinking or intoxicated. Yet many persons do it.

The pain and suffering caused by motorcycle accidents are much too real. The satisfaction I obtain in my work is that of being able to alleviate, treat and heal some of the suffering. However, the majority of the motorcycle accident patients whom I have treated were due to alcohol intoxication or horseplay. You can expect the best treatment which I am able to give but don't expect very much sympathy!

Do yourself a favor – ride that bike safely and keep yourself fit for the folks back home.

HM1 Richard A. Hargrave, USN
VP-47

Controllers: Take Charge

NAS Several Places – As the trend is to take issue with the news media for showing only the bad, it is felt that your article in the May 71 APPROACH entitled, "Controllers: Take Charge" falls somewhat within this category. Points that we feel were overlooked were . . . How many landings, takeoffs, GCA, CCA and instrument approaches were handled without incident (in ratio as you do with pilot error accidents vs flight hours flown)? How many "saves" (no gear, approach made to the wrong runway or airport, etc.) did controllers make? How many violations of course rules or not following instructions were not reported or handled by an informal telephone call? The list could go on and on.

There was no mention (atta-boy) in the article itself, although it was shown in the figures, how much decrease was noted in FY-70 as compared to FY-69. Hopefully this encouraging decrease has continued into FY-71. It might be pointed out that the personnel turnover in air traffic control is tremendous. The lucrative pay of the FAA attracts most Navy controllers, sometimes after their second or third enlistment. This results in a constant training effort aimed toward what you and we desire, "The safe, orderly and expeditious flow of air traffic." I am sorry to say that it is not uncommon, throughout the Navy, to have one facility-rated supervisor attempting to observe simultaneously the actions of two or more trainees. A controller is a trainee until qualified in all positions and facility-rated. This process normally requires six to 18 months based on previous experience and ability.

FLIP Changes

THE Department of Air Force, Headquarters Aeronautical Chart and Information Center, St. Louis, Missouri has notified the Naval Safety Center of the following changes to FLIP documents:

- *Departure Notification:* Civil airports do not automatically notify a FSS (Flight Service Station) of an aircraft's departure time as military fields do. It should be noted that this includes stopover flight plans and that after each takeoff from a civil field the pilot must contact a FSS and pass his actual takeoff time. (FLIP Planning Section II, N&S America, Section II, Par 1, D.)
- *Canadian Cruising Altitudes:* Canada has extended the use of 1000 feet of vertical separation for IFR flights up to FL 290 and redesignated cruising altitudes. This eliminates the possibility of opposite direction traffic being at the same altitude in the area of the boundary between U.S. and Canadian airspace.

We *also* would like to chant the Robert Burns poem and have others see *us*. A personal question to your pilot readers would be, "When was the last time you visited the control tower, radar room or GCA unit?" At a busy location such as this (except for Operations Department officers and others during a high tempo emergency or air show) the monthly average of pilots visiting the air traffic control facility would not exceed three.

We do not take exception to the quote that operations officers, supervisors and controllers must take continued positive action in the elimination of these errors in an effort to improve the safe control of aircraft. Amen, amen.

Concerned Controller

P.S. Your "cold facts" which are sometimes disturbing to some, and are meant to be, were appreciated and will be incorporated into our training program.

● This letter is the kind we like to get. Here is someone who knows what he is talking about, has given thought to the purpose of the article, has taken us to task (properly so) for not mentioning the "good things," has pointed out the shortages – quality and quantity – of controller personnel and signs off with a comment of we-will-use-what-information-we-can-in-our-training-program.

In preparing the article certain personnel were included whose jobs require control of aircraft but who are not controllers, in the professional sense, nor are they controllers by rating. If the reporting system to NAVSAFECEN included "the good things" we could have added appropriate columns in the statistics but only the boo-boos (the accident reports and incident reports) are received. Occasionally in one of these reports there is information concerning the real pro in action and a good show or an atta-boy is prepared for publication.

As to the subject of how many operations are handled correctly and safely, or how many saves controllers make, there just aren't any records. In addition to the people problem, most controllers have to operate with antiquated equipment. The ungodly squeals, squawks and distortion of radio transmissions in the tower don't make the controller's job any easier.

All of you controllers accept a pat on the back from NAVSAFECEN and while you are trying to communicate under adverse conditions and with antiquated equipment, continue to take positive action in eliminating the errors that effect the safe control of air traffic. Hopefully, improvements are on the way. ◄

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RADM W. N. Leonard
Commander, Naval Safety Center

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This month's cover painting by Blake Rader is an evocation for freedom's light to shine throughout the world and provide hope wherever the people are oppressed and sick at heart. Pg. 18-19 Photos (top center and lower right) 20-21 (all diagrams) 22-23 Photo and diagram courtesy Hawker Siddeley. Pg. 21 Photos by LCPL D. C. Snyder, USMC.

COMPLACENCY

OF the many threats to a successful safety program, one of the most common and persistent is complacency. Complacency in itself is a deceiving and unwarranted satisfaction with a given level of proficiency which leads to stagnation and unknowing deterioration of proficiency. It is of primary concern to any organization and a major problem area requiring constant supervisory surveillance. When it develops among pilots or maintenance personnel it inevitably results in mishaps, both in the air and on the ground.

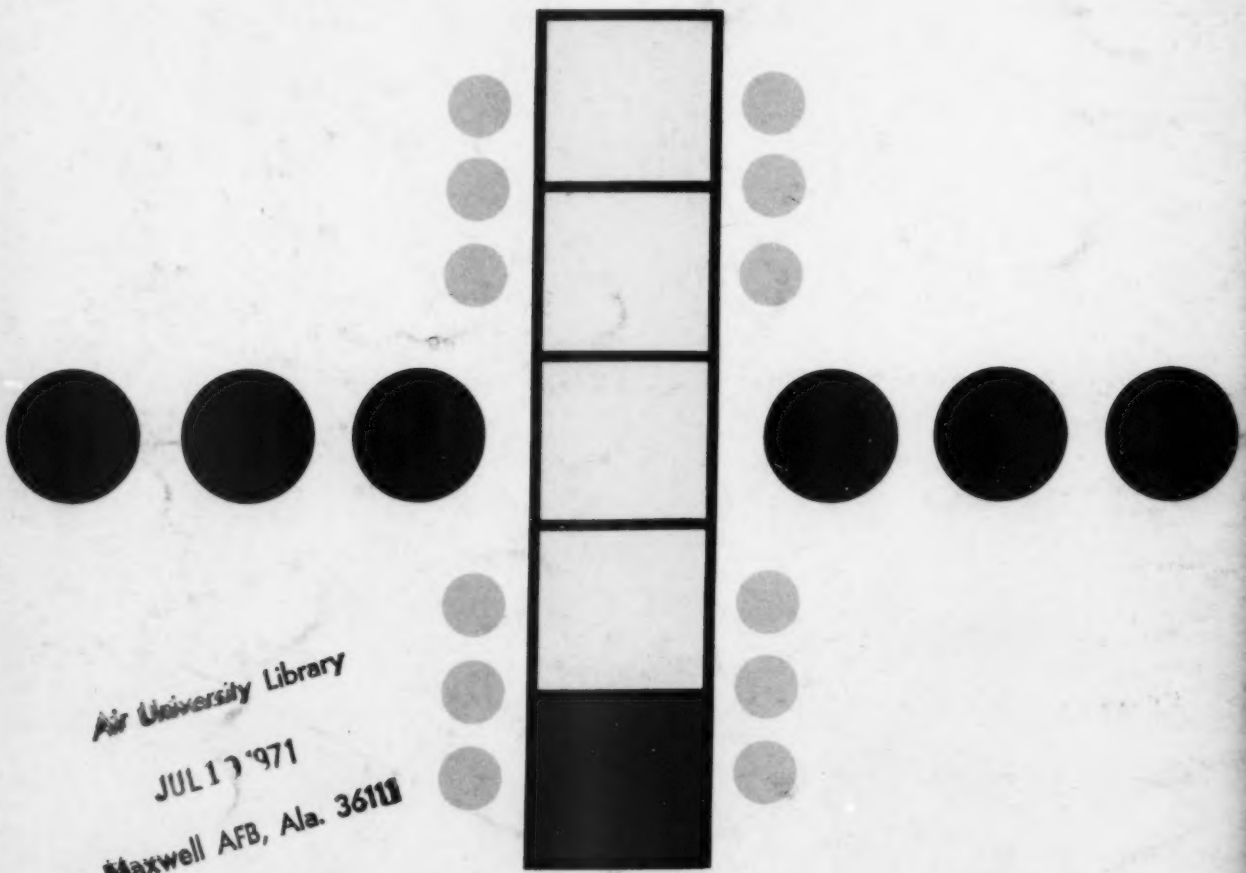
Recognizing the onset of complacency is not a difficult task. Signs develop as supervisory controls are relaxed and objectives become vague. There is an observable lack of dedication and enthusiasm to the job and the routine prescribed standards of performance and care are disregarded. For example: pilots in a routine environment, lulled by their level of experience and proficiency, may rationalize that detailed flight planning is unnecessary. Briefings become sketchy or nonexistent as the pilots assume that crewmembers understand what is expected of them or what their responsibilities and assignments are. This attitude will be reflected throughout the entire flight, resulting in inefficient utilization of flight time which may terminate in an incident, accident or injury. Similar analogies can be made for the maintenance department personnel which would soon reflect the effect of a complacent attitude through mismanagement of men and material assets. The results are the same; a disregard for the normal standards of quality workmanship, a lack of commitment and an increase in accident potential.

The old cliche, "an ounce of prevention is worth a pound of cure," is certainly applicable in this case. Combating complacency once it has developed is extremely difficult. Preventing its development is obviously the simplest and desired approach to the problem. In either case, prevention or correction, the measures to be taken are basically the same. Supervisors must establish the required standards of performance and quality production which become well known and understood. Following this, the supervisor must assure that the established standards are maintained through the exercise of reasonable *discipline* and firm *leadership*. Supervisors must delineate the objective requirements and provide their personnel with the means by which ultimate achievement can be accomplished. Pilots, mechanics and clerks provided with challenging and attainable goals along with the knowledge and incentive required to achieve these objectives will not be complacent.

Commanding Officer
MAG-56

Idea contributed by LCDR R. F. Sullivan, VA-165

FARM



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